AMERICA'S LARGEST TEXTILE MONTHLY

COTTON

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ADAMANT
(Reg. U. S. Pat. Office)
PORCELAIN GUIDES
for
TEXTILE MACHINERY
We call the attention of textile manufacturers to the extra hard quality of our Porcelain, which is the very best that is made. Specify our Adamant Porcelain Guides on your orders.
Beware of infringements and inferior quality.
Mitchell-Bissell Co.
334 FOURTH AVENUE
NEW YORK
FACTORY, TRENTON, N. J.
Write for Catalogue

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What "Franklin Process" Means

1 The greatest job yarn dyeing capacity in America, composed of three plants located in three of this country's leading textile centers, — Providence, Philadelphia, Greenville, S. C.

2 That cotton yarns, worsted yarns (including fine singles that can not be dyed by any other process), Merino yarns, hard twisted cords for tire fabrics, fire hose and cable cords, silk noils, fine splicing cotton yarns for hosiery, etc., can be dyed in the wound form in a closed kier under pressure.

3 The most concentrated dye bath known to the dyeing industry,— a gallon of liquor to a pound of yarn.

4 A most thorough penetration of the yarn by the dyes, resulting in exceptionally solid, even, brilliant and fast colors.

5 The elimination of skeins and warps with their attendant yarn waste.

6 The elimination of beamers and one winding process in colored goods mills.

7 That you can ship yarn to us on bobbins, tubes, cones, cops or jackspools and that we can return it after dyeing on 3″ or 6″ Franklin tubes, paper tubes, cones or jackspools.

8 That by storing with us a surplus stock of grey yarn, already wound on Franklin Tubes you can obtain deliveries of dyed yarns, when necessary, in two or three days.

9 That you can eliminate part of your transportation and book-keeping costs by having us furnish your grey yarn, if you so desire.

10 That manufacturers who feature the fact that their goods are Franklin dyed have a selling point which appeals strongly to converters.

If you wish to know why FRANKLIN PROCESS means all this, if you wish to see actual demonstrations of many of these points, write us to-day.

FRANKLIN PROCESS COMPANY

Yarn Dyers · Yarn Merchants · Mfrs Glazed Yarns Dyeing Machines

Philadelphia · PROVIDENCE · Manchester, Eng.

New York Office 72 Leonard St.

SOUTHERN FRANKLIN PROCESS COMPANY

Greenville, S. C.

The Draper Corporation

Compliments the Textile Industry of the South upon its wonderful progress during the past 25 years.

We have watched with great pleasure the tremendous strides made from year to year. From a small start you have grown until your mills now compare favorably with any mills in the World.

We have always found you ready and willing to co-operate in the introduction of new and improved machinery and responsive to new ideas for the betterment of the industry. We appreciate this co-operation and rejoice with you and Cotton in celebrating your achievements and deserved success of the past quarter century.

DRAPER CORPORATION

HOPEDALE MASSACHUSETTS

SOUTHERN OFFICE ATLANTA GEORGIA

Copyright 1917 by Draper Corporation

Over 400,000 Northrop Looms

Are in operation in the Textile Mills of America. Have you asked yourself

Why?

Or how they might help you in the present industrial situation?

Let's Talk It Over

DRAPER CORPORATION

HOPEDALE MASSACHUSETTS

SOUTHERN OFFICE ATLANTA GEORGIA

Copyright 1917 by Draper Corporation

Have You Looked Over

Your Warpers and Spoolers

Recently to see if they are of the proper type to meet the present conditions of the industry? Good Yarn Preparation makes possible a more effective use of the advantages of automatic machinery in the Weave Room. Our late Warpers and Spoolers have many improvements

Designed to Meet Modern Conditions

and contribute to the economical operation of the Weaving department. Eternal vigilance is the price of liberty—and manufacturing profits. Our experts are at your service. Perhaps they can point out possible economies in your Warping and Spooling departments.

Let's Talk It Over

DRAPER CORPORATION

HOPEDALE MASSACHUSETTS

SOUTHERN OFFICE ATLANTA GEORGIA

Copyright 1917 by Draper Corporation

PAY FOR THEMSELVES IN ADVANCE

Suppose you are a manufacturer generating your own power, and that you are planning either to install group drives or build an addition to your present plant.

Your equipment—boilers, generators, motors, etc.—will cost you $175.00 per horsepower, at a conservative estimate. On that basis, a thousand horsepower set will cost $175,000.00.

But suppose you were to equip your line shafting with **Fafnir Double Ball Bearing Hanger Boxes.** In that case, 900 horsepower or less, would be sufficient to do the same effective work. The installation would then cost you $17,500.00 less, which would probably pay the bill for the ball bearing boxes.

In other words, you would be getting the **Fafnir Double Ball Bearing Hanger Boxes** for nothing, and the operating saving would be 100 per cent profit.

THE FAFNIR BEARING COMPANY

New Britain, Conn.

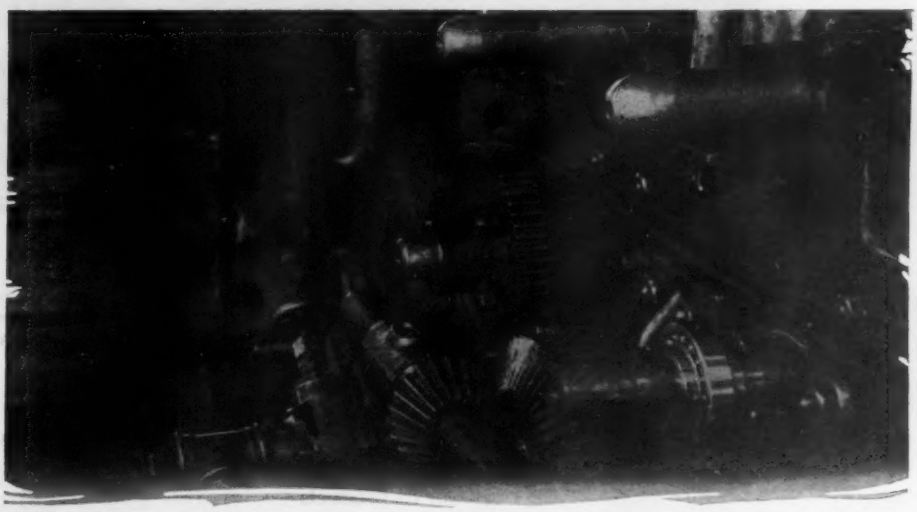
Southern Representatives

O. R. S. Pool,
Box 1375, Greenville, S. C.

W. Shaw,
358 South Converse St., Spartanburg, S. C.

FAFNIR

SKF



Ball Bearings on Size Rolls

Prevent Size Leakage—Reduce Maintenance

WHEN plain bearings are used on size rolls the temperature of the sizing mixture soon causes the lubricant to volatilize, leaving a sticky, gummy mass devoid of lubricating qualities. As a result plain bearings wear rapidly, causing the weight of the roll to fall upon the stuffing boxes which in turn wear and permit the sizing to leak out.

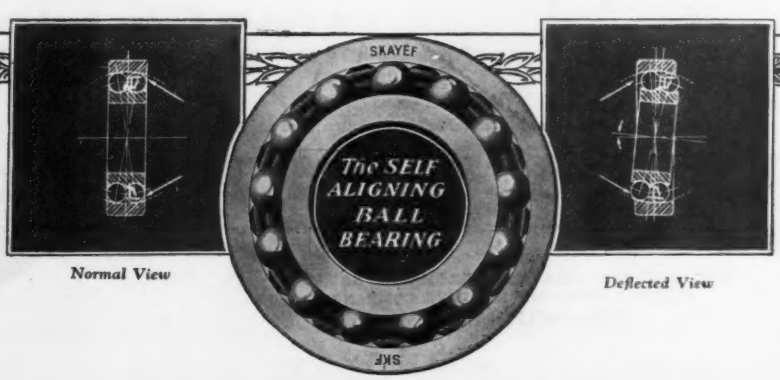
With Skayef self-aligning ball bearings less volatile lubricants may be used and since this type of bearing develops no discernible wear, the roll is kept permanently in the center of the stuffing box without need of bearing adjustments. As a result there is no stuffing box wear and consequently no leakage of the sizing.

May our engineers outline the reasons for the superior performance of SKF marked ball bearings and explain why they will keep your mill in continuous operation, prevent needless wastes and improve the quality of your finished product.

THE SKAYEF BALL BEARING COMPANY

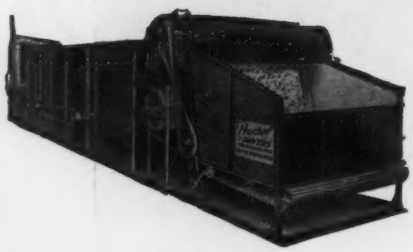
Supervised by SKF INDUSTRIES, INC., 165 Broadway, New York City

1103

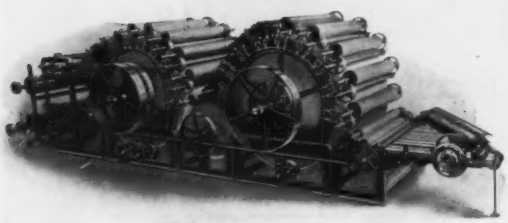


Normal View *Deflected View*

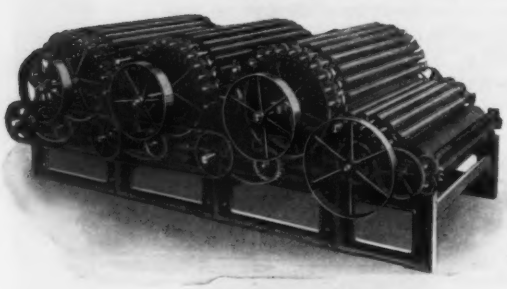
BALL BEARINGS
The Highest Expression of the Bearing Principle



DRYERS



CARDS



GARNETTS

A Busy Five Acres

Where the hum of thriving production over 223,000 square feet of efficient modern machinery and work space, supplies the best evidence of the world-demand for its products —

"Proctor"

DRYING MACHINERY
for all Textile Materials

"Smith-Furbush"

CARDING, GARNETT,
PREPARATORY, FELTING
& WASTE MACHINERY

From a very small start in 1812, the business of Proctor & Schwartz, Inc., has grown to require this great plant, on the firm foundation of producing every machine the best for its specific purpose.

PROCTOR & SCHWARTZ, INC.

Formerly
THE PHILADELPHIA TEXTILE MACHINERY CO.
SMITH & FURBUSH MACHINE COMPANY
PHILADELPHIA, PA.

Standard angle reflector for distributing light at an angle.
Standard Bowl Reflector for a concentrated distribution.
RLM Standard Fixture for any but the most specialized use.
Vapor proof fixture for use in explosive atmosphere.
Mill Type Reflector of sturdy construction to withstand vibration.

Hit or Miss

W WESTINGHOUSE ELECTRIC

Lighting problems have too often been handled in a hit or miss manner. The vital importance of the subject has not been realized.

An Illuminating Engineering Bureau has been established by the Westinghouse Company to cooperate in the movement for improved lighting and to assist industrial executives, architects and others with their lighting problems.

All guess work is eliminated under the guidance of this Bureau; the most efficient method of lighting is assured.

To obtain this assistance and further information on our other types of lighting equipment, write to our nearest representative.

Westinghouse Electric & Manufacturing Company
George Cutter Works South Bend, Ind.
Sales Offices in All Principal Cities of the
United States and Foreign Countries

Westinghouse

Electrifying *the*

The most important event in the history of textile manufacuring since the substitution of mechanical power for human labor, was the introduction of individual-motor drive.

The application of alternating current and the alternating-current induction motor to the textile industry were Westinghouse ideas. They alone made complete electrification of the textile industry possible.

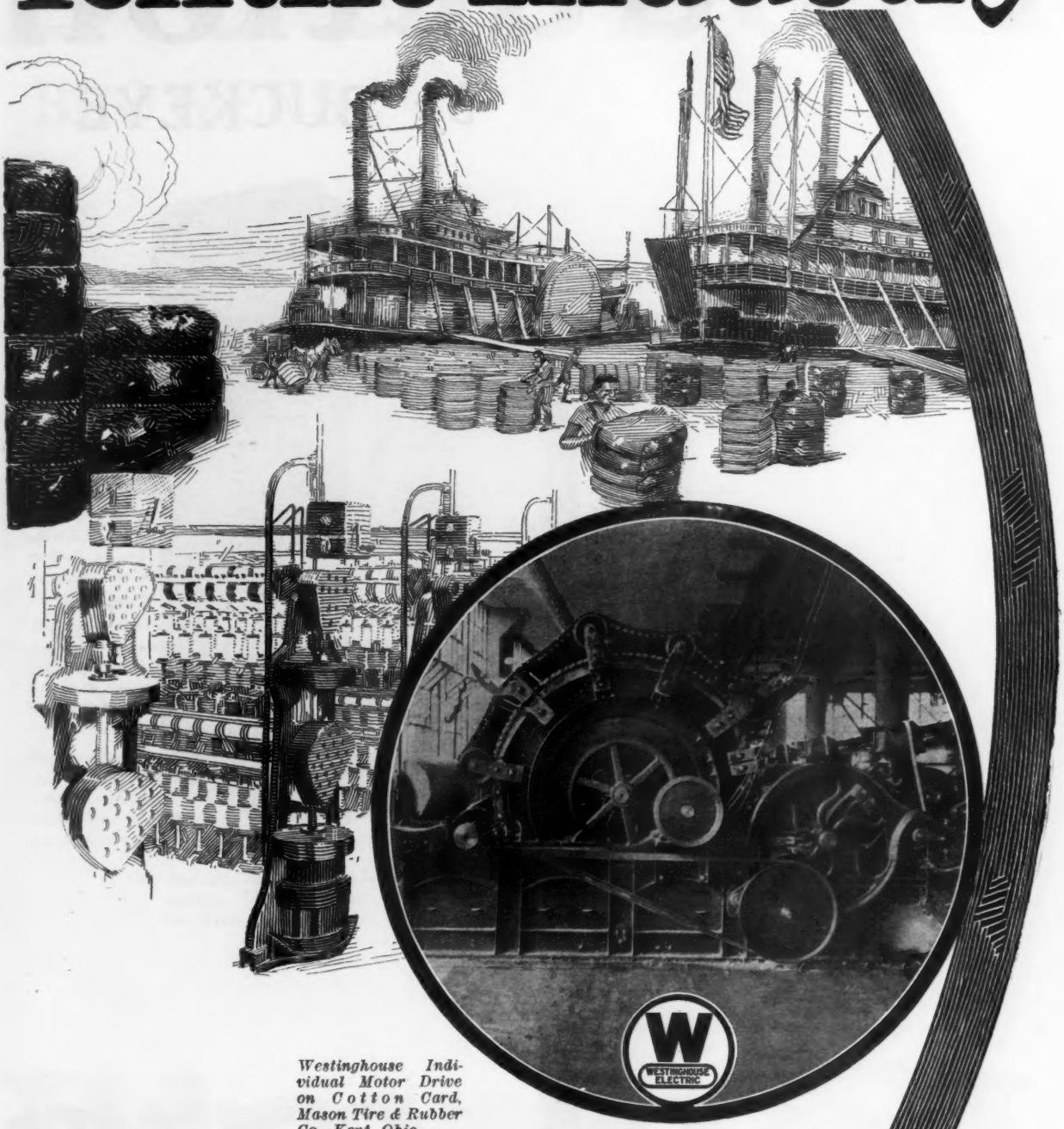
It was the Westinghouse Company that first appreciated the value of individual-motor drive in the textile industry. While other manufacturers were advocating group drives, Westinghouse engineers were engaged in an extensive study of the advantages of individual-motor drive. The first large installation of individual textile motors was made in 1902 at the plant of the Sauquoit Silk Company, Philadelphia, by the Westinghouse Company. The individual-motor drive has proved its superiority over all other methods and its superiority is now universally recognized by textile manufacturers.

Westinghouse Electric & Manufacturing Company

East Pittsburg, Pa.

Westinghouse

Textile Industry



Westinghouse Individual Motor Drive on Cotton Card, Mason Tire & Rubber Co., Kent, Ohio.

Westinghouse

Production

by BUCKEYE

Buckeye Blowers are manufactured by the makers of Heatovent, the unit control ventilating system for offices, factories, schools and other buildings where individual ventilation for various rooms is desirable. This company is thus in position to plan and produce complete ventilating systems of every description. Call our engineers into consultation.

Buckeye

Columbus,

SOUTHERN OFFICE:

Doubled!

BLOWERS

Through proper application of Buckeye Blowers to cotton mill requirements, engineers of this company have actually increased a mill's production one hundred per cent. Investment in Blowers of the proper type and efficiency has thus accomplished the same result as doubling the original investment in land, buildings and equipment:

Such an accomplishment is made possible only by a blower system of unusually high efficiency installed under the skilled direction of experienced engineers. This, in short, is what the Buckeye Blower Company has to offer mill owners.

Buckeye Blowers are the product of a company possessing long experience in every phase of heating and ventilation. Accurate and correct design, proved right in actual use, and the best and most careful workmanship are assured.

But here Buckeye service only begins. In each of our branch offices is maintained a skilled consulting engineer. Before any installation of Buckeye Blowers is made, this engineer goes over the ground thoroughly and makes certain that the most efficient system has been specified.

The result is inevitable. Planned right, made right, and approved by experts as the most suited to existing requirements, every Buckeye Blower system proves itself in use as the best to be had.

Perhaps your mill is working under capacity. Perhaps your drying is slowed down, your dye-room efficiency reduced, or the general effectiveness of your workers lessened by improper blower equipment. The Buckeye Blower engineers at your service cannot only tell you what is wrong, but just exactly how to make it right.

Call them in. They are at your disposal.

Our new catalogue will be ready for distribution this month. Write either our Atlanta office or direct to the factory.

Blower Co.

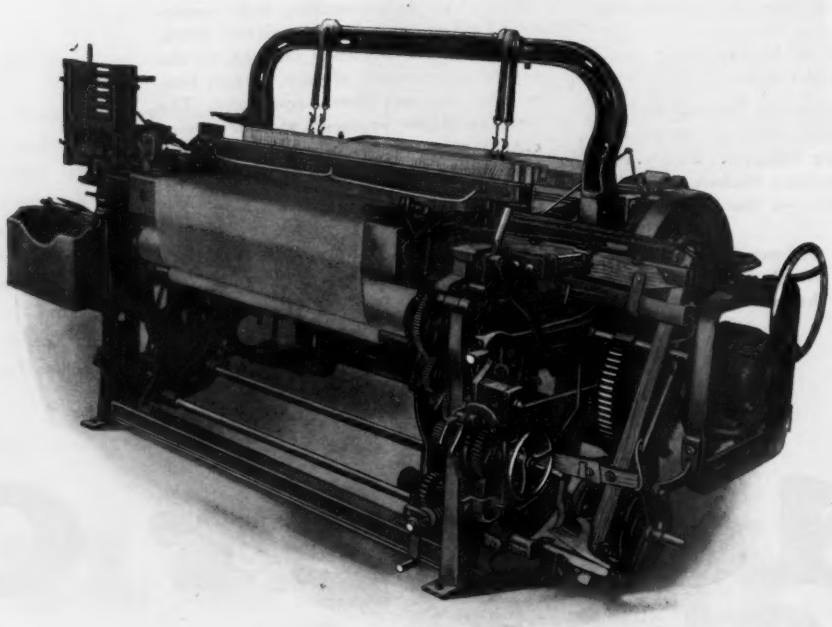
Ohio.

ATLANTA, GEORGIA

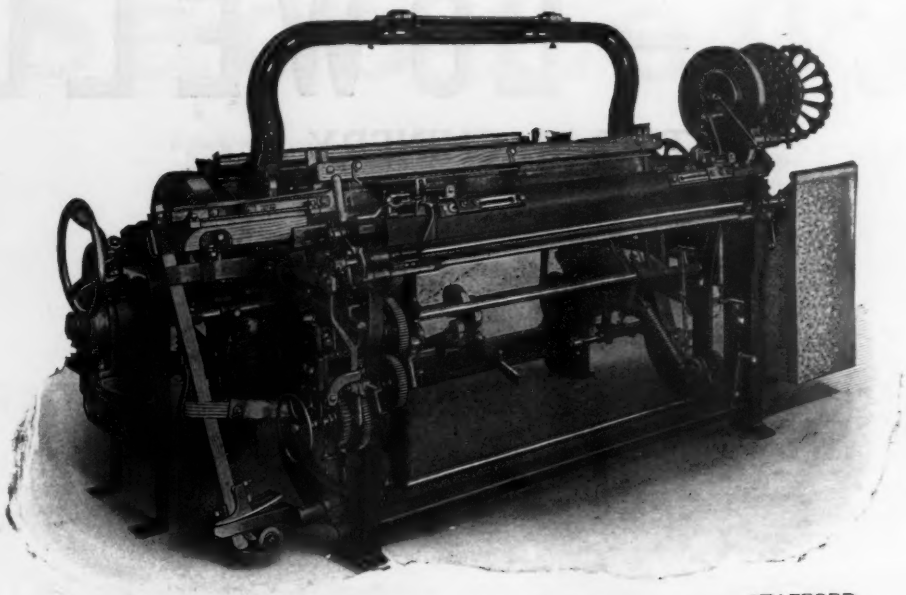
STAFFORD

Satisfactory Service

One reason why Stafford looms give universal satisfaction is the way they stay put after once being started up. This is due to points of design and construction which are exclusive Stafford features. The result is low up-keep and high production coupled with the high quality of fabric which is inseparable from Stafford looms.



STAFFORD
Shuttle-Changing
Automatic Loom



STAFFORD
Bobbin-Changing
Automatic Loom.

Sturdy Construction

Freedom from excessive breakage means much to a mill besides the mere cost of the parts.

For instance have you ever figured out what it means in dollars and cents every time a crank shaft breaks in one of your looms?

The breakage of crank shafts on Stafford looms is almost nil.

Let us send you our new illustrated catalog.

THE STAFFORD COMPANY

WEAVING MACHINERY

READVILLE, MASS.

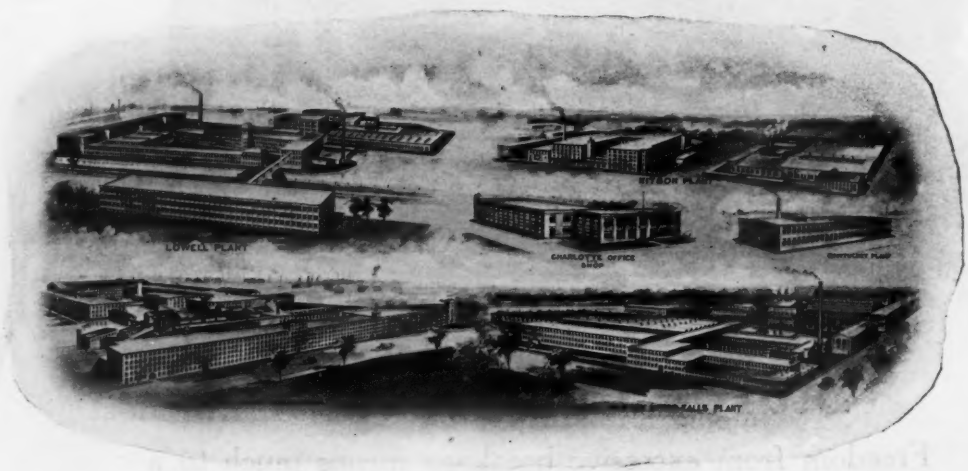
Southern Agent FRED H. WHITE Charlotte, N. C.

AUTOMATIC LOOMS

SACO-LOWELL

TEXTILE MACHINERY

Largest Builders in America



COTTON WORSTED

AND

SPUN SILK

WASTE RECLAIMING AND SPINNING MACHINERY

SACO-LOWELL SHOPS

ROGERS W. DAVIS
Southern Agent
Charlotte, N. C.

Branch Southern Office
Greenville, S. C.

77 Franklin St.
BOSTON, MASS.

SHOPS:
Biddeford, Me.
Lowell, Mass.
Newton Upper Falls, Mass.
Pawtucket, R. I.
Charlotte, N. C.

Saco-Lowell

TEXTILE MACHINERY

ACCESSORIES

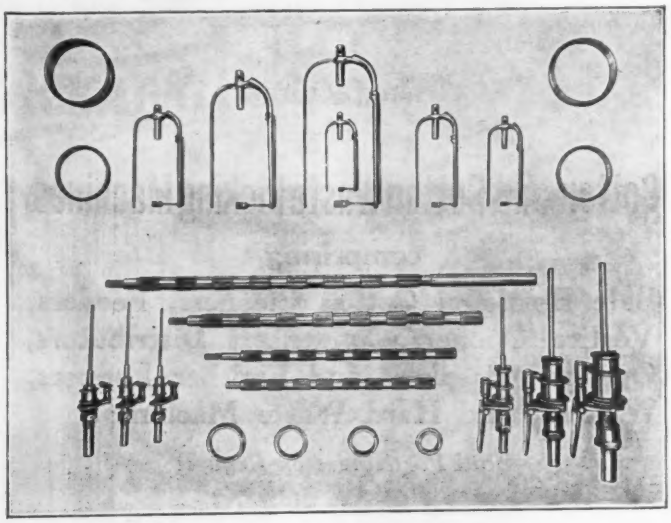
INCLUDING

FLYERS RINGS ROLLS SPINDLES

SPINNING AND TWISTER RINGS

ROVING SPINNING AND TWISTER SPINDLES

FLUTED AND PLAIN ROLLS



ROVING FLYERS

HANK AND LEESE CLOCKS

POSITIVE DENT COMBS

WARPER BEAMS

TIE CUTTERS

ALL ACCESSORIES MADE IN OUR OWN SHOPS BY IMPROVED METHODS AND TOOLS. A FINISHED PRODUCT OF THE HIGHEST QUALITY, THOROUGHLY DEPENDABLE AND UNCONDITIONALLY GUARANTEED, SUPPLIED IN ANY SIZE OR QUANTITY

EXECUTIVE OFFICES:

BOSTON, MASS.

ROGERS W. DAVIS, Southern Agent, Charlotte, N. C.

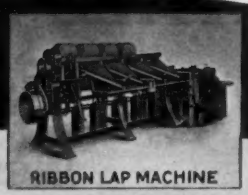
Southern Branch Office, Greenville, S. C.

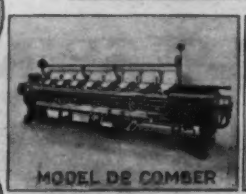
WHITIN MACHINE WORKS

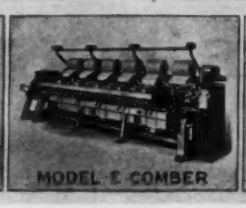
ESTABLISHED 1831

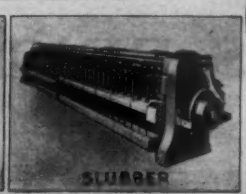
TEXTILE MACHINERY

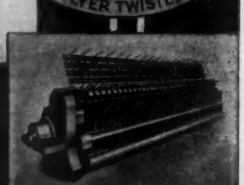
MAIN OFFICE AND WORKS, WHITINSVILLE, MASS., U.S.A.











Manufacturers
of

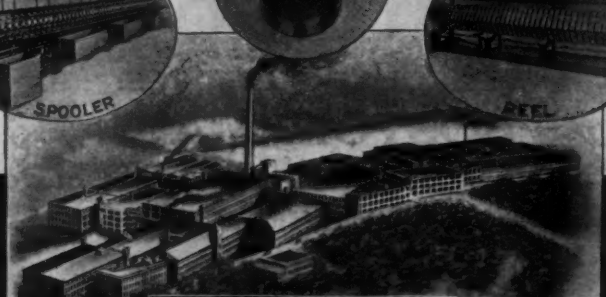
Cotton and Cotton Waste Picking Machines

comprising

Bale Breakers, Cotton Cleaners, Feeders, Vertical Openers, Condensers, Distributors, Openers, Breakers and Finisher Lappers, Willows, and Hard Waste Machines.

Full Particulars on Request

BRANCH OFFICE
CHARLOTTE,
N.C., U.S.A.



Just Like an Insurance Policy

A fire insurance policy protects you against loss by fire; Hockaday protects your property from the ruthless paw of depreciation. Hockaday is wall insurance. It prevents peeling, air-checking, suction and lime-burning.

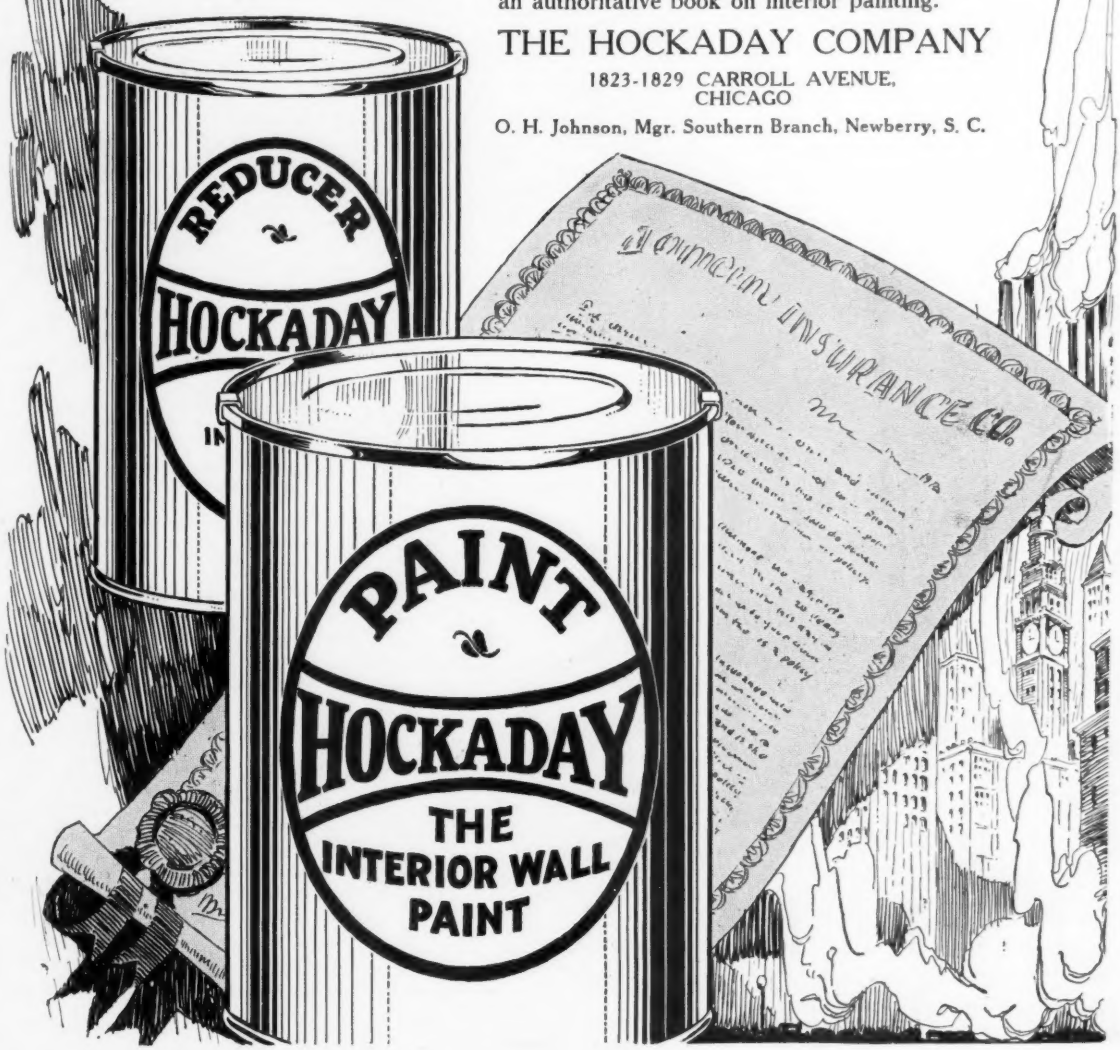
Ten years is a long time when measuring a paint's life. But many Hockaday'd jobs show that ten years is the average span of Hockaday's life. Hockaday's original beauty is easily restored by washing.

Let us send you the money-saving Hockaday facts. Ask for "Paint Mileage"—an authoritative book on interior painting.

THE HOCKADAY COMPANY

1823-1829 CARROLL AVENUE, CHICAGO

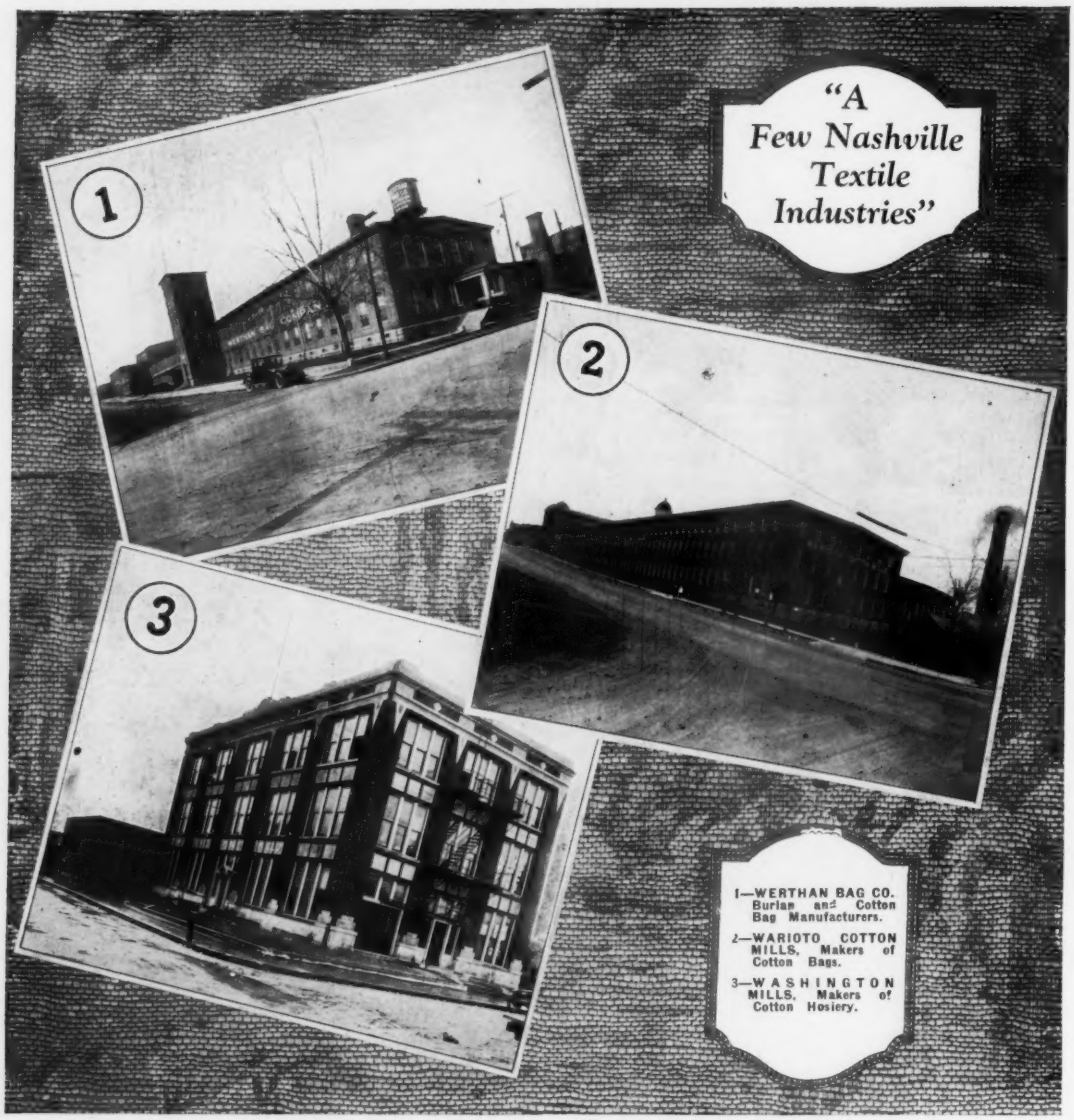
O. H. Johnson, Mgr. Southern Branch, Newberry, S. C.



HOCKADAY

THE WASHABLE PAINT FOR ALL INTERIORS

Tennessee-The Hear


"A Few Nashville Textile Industries"
1
2
3
1—WERTHAN BAG CO. Burlap and Cotton Bag Manufacturers.
2—WARIOTO COTTON MILLS. Makers of Cotton Bags.
3—WASHINGTON MILLS. Makers of Cotton Hosiery.

The Tennessee El

art of Industrial America

Build Your Mill in Nashville—Why?

SIX BASIC REASONS

1. *The best labor conditions in the South.*
   Nashville offers to the textile industry a vast untapped supply of intelligent American-born workers.
2. *Advantageous geographical location.*
   Nashville's location on the Cumberland River in central Tennessee is the center of the great southern market and within easy access to all eastern, northern and western points. Within a 500 mile radius of Nashville is included over 40% of the total population of the United States.
3. *Nearby sources of raw materials.*
   Cotton is grown in neighboring counties and brought to Nashville on short haul.
4. *Transportation facilities are excellent.*
   Trunk line railroads with their connections provide service to all parts of the country. Rates are favorable to Nashville.
5. *Power is cheap and the supply inexhaustible.*
   A vast super-power system comprising 190,000 horsepower in hydro-lectric and steam plants is available for Nashville's use —and 82,200 horsepower more is now under construction. The mountains, rivers and streams of east Tennessee afford unlimited facilities for future power development.
6. *Favorable construction conditions.*
   Cheap land.
   Low construction costs.
   Dependable building labor.
   Low taxes.

Additional information about Nashville as an industrial center will be gladly furnished interested manufacturers upon request.

THE TENNESSEE ELECTRIC POWER CO
CHATTANOOGA, TENNESSEE

FIVE ADVANTAGES IN TENNESSEE

1. Ideal climate the entire year.
2. Raw materials of all kinds in abundance.
3. Market facilities — unsurpassed rail and water transportation.
4. Ample supply of intelligent and stable labor.
5. Continuous and reliable electric power at low cost.

lectric Power Co-

Automatic Spoolers
High Speed Warpers
Ball Warpers
Twister Creels

"Every Knot a Weaver's Knot"

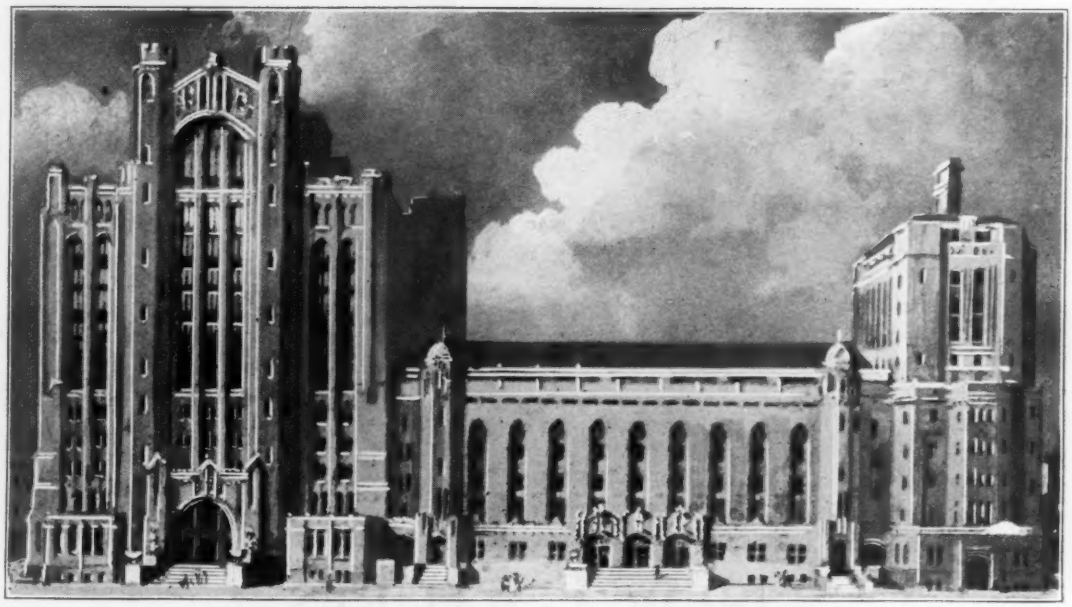
Barber-Colman Company

Rockford — Illinois

Boston, Mass. **Greenville, S.C.**

Viskalt Membrane Roof

Pliant Under Stress



The new Masonic Temple in Detroit, George D. Mason & Co., Architects and Builders

—on the largest Masonic Temple in the United States

THE new Masonic Temple in Detroit, erected at a cost of $5,000,000, is protected from the weather with a Viskalt Membrane Roof.

This beautiful structure can accommodate more than 15,000 people without the least confusion. Its electrical plant is large enough to supply power and light for a small city. Significant, indeed, is the fact that after exhaustive tests and thorough investigation the architects, Messrs. George D. Mason and Company, assisted by a competent building committee, finally chose the Viskalt Membrane Roof for this, the largest Masonic Temple in the United States.

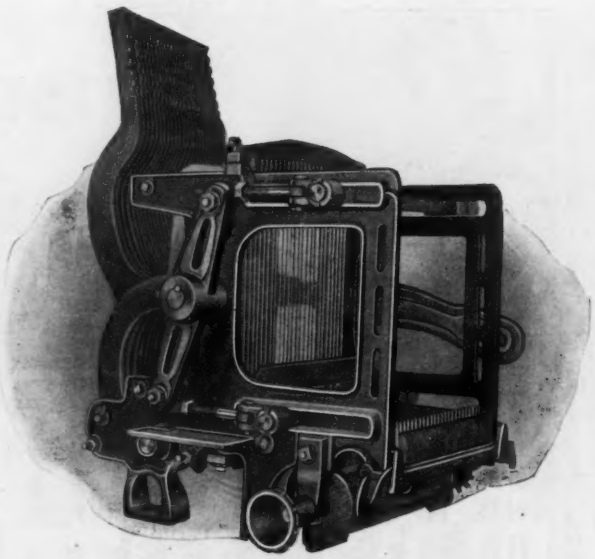
Fifty-five years of manufacturing experience are back of the materials used in a Viskalt Membrane Roof. There is a Viskalt Compound for every waterproofing need. Architects, engineers, and owners may have complete specifications by applying to the Construction Materials Division, Dept. 44-J 1008 Fisk Building, New York City.

The RICHARDSON COMPANY
Lockland (Cincinnati) Ohio
Chicago New Orleans New York City
Atlanta Dallas

RICHARDSON ROOFING

© 1924, The Richardson Company

DOBBIES



NEW FEATURES

1. We are now prepared to equip the dobby shown above with **pressed steel jack backs** (patented) and **drop forged top and bottom hooks** (patented).
2. Built with **slotted fingers,** and **locking rod,** (patented), making it easy to remove, clean and replace the fingers.

We call attention to the carefully machined swivels and studs used for operating the dobby knives.

This dobby can be applied readily to any make or type of loom.

This dobby will outwear any other dobby on the market.

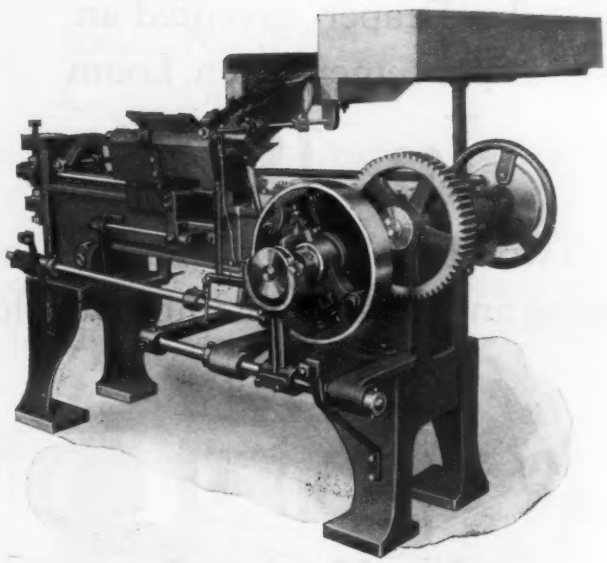
CROMPTON & KNOWLES LOOM WORKS

WORCESTER, MASS. U.S.A.

PROVIDENCE, R.I. PHILADELPHIA, PA. PATERSON, N. J.

S. B. ALEXANDER, CHARLOTTE, N. C., SOUTHEHN MANAGER.

BOBBIN STRIPPER



THIS MACHINE WITH ONE OPERATOR SHOULD DO THE WORK OF TWO PEOPLE AND PAY FOR ITSELF IN A YEAR.

CROMPTON & KNOWLES LOOM WORKS

WORCESTER, MASS. U.S.A.

PROVIDENCE, R.I. PHILADELPHIA, PA. PATERSON, N.J.

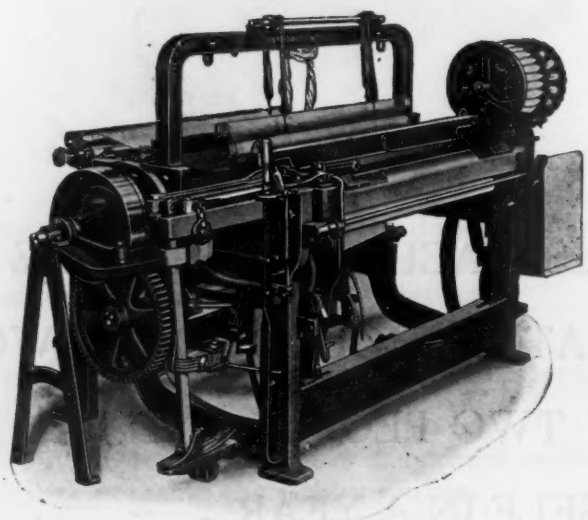
S. B. ALEXANDER, CHARLOTTE, N. C., SOUTHERN MANAGER.

In 1816

Ira Draper invented an improvement on a Loom

In 1924

Two of his great-grandsons are making and selling an improved loom



Under the incorporated name of

The HOPEDALE Mfg. Co.

Operating a new and enlarged plant at

MILFORD, MASS.

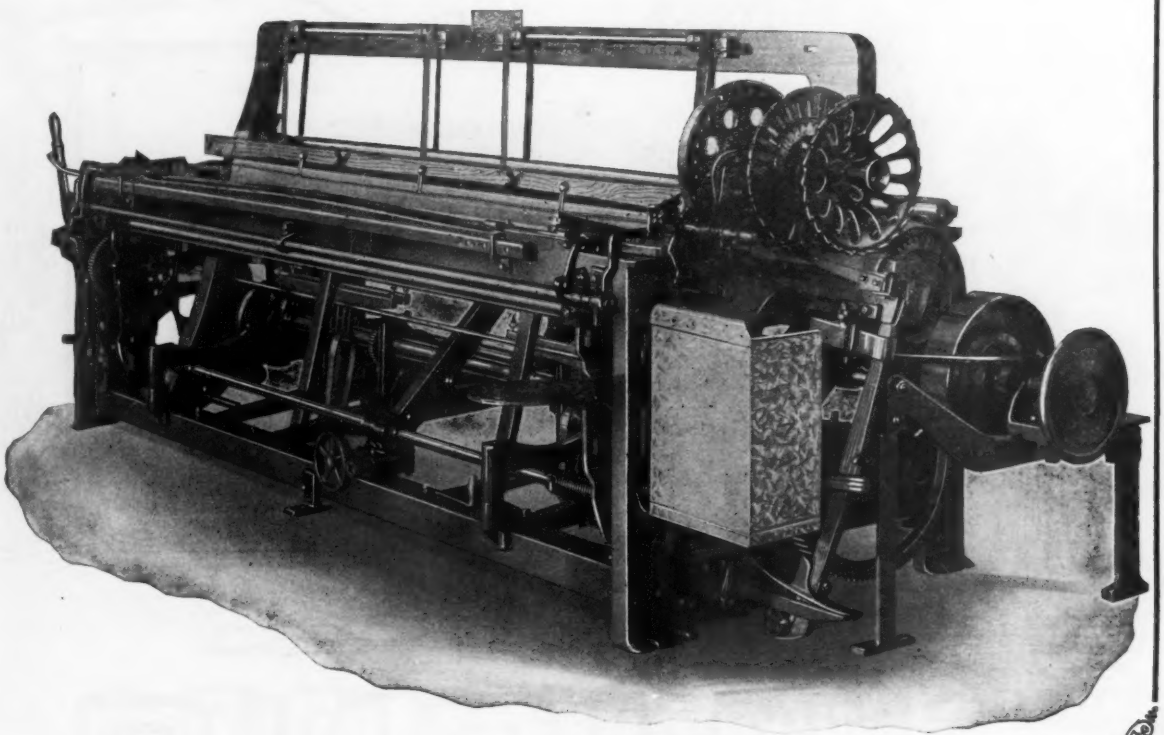
Southern Office at Greenville, S. C.

This HOPEDALE Mfg. Co.

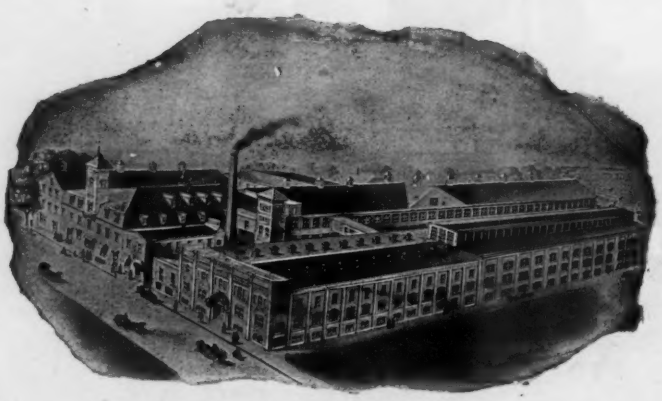
Includes as officers

Jonas Northrop
C. H. Draper
George Otis Draper
F. E. Norcross

These men have been associated with the continued development of Automatic Weaving



From the Acorn to the Oak



EMMONS

This Growth Founded on Square Dealing, Faithful Service and 100% Quality

It was in a small shop in the year 1866 that Emmons started the manufacture of loom harness and reeds. From that time on, the growth of this business has been remarkable, due solely to our initial determination to give maximum quality at a fair price and honestly and faithfully rendering every customer the kind of service he wants and deserves.

From the little acorn grew the mighty oak. The little shop grew into the plant which today is the largest in the country manufacturing loom reeds and harnesses.

The name "Emmons" is known to the textile world as a mark of quality in loom harness and reeds. There are few mills in this country, as well as abroad for that matter, who do not use one or more Emmons products, and every one of them acknowledges the high quality, reliability and serviceability of Emmons.

To those mills who are not now users of Emmons Products, we ask only a chance to get better acquainted and prove to you that Emmons products and service will mean better satisfaction and greater economy in loom harness and reed sthroughout the many years to come.

Let's get acquainted. Write "Emmons" on that next order for any of the products listed at the right. Prices and information will gladly be furnished.

EMMONS LOOM HARNESS CO., LAWRENCE, MASS.

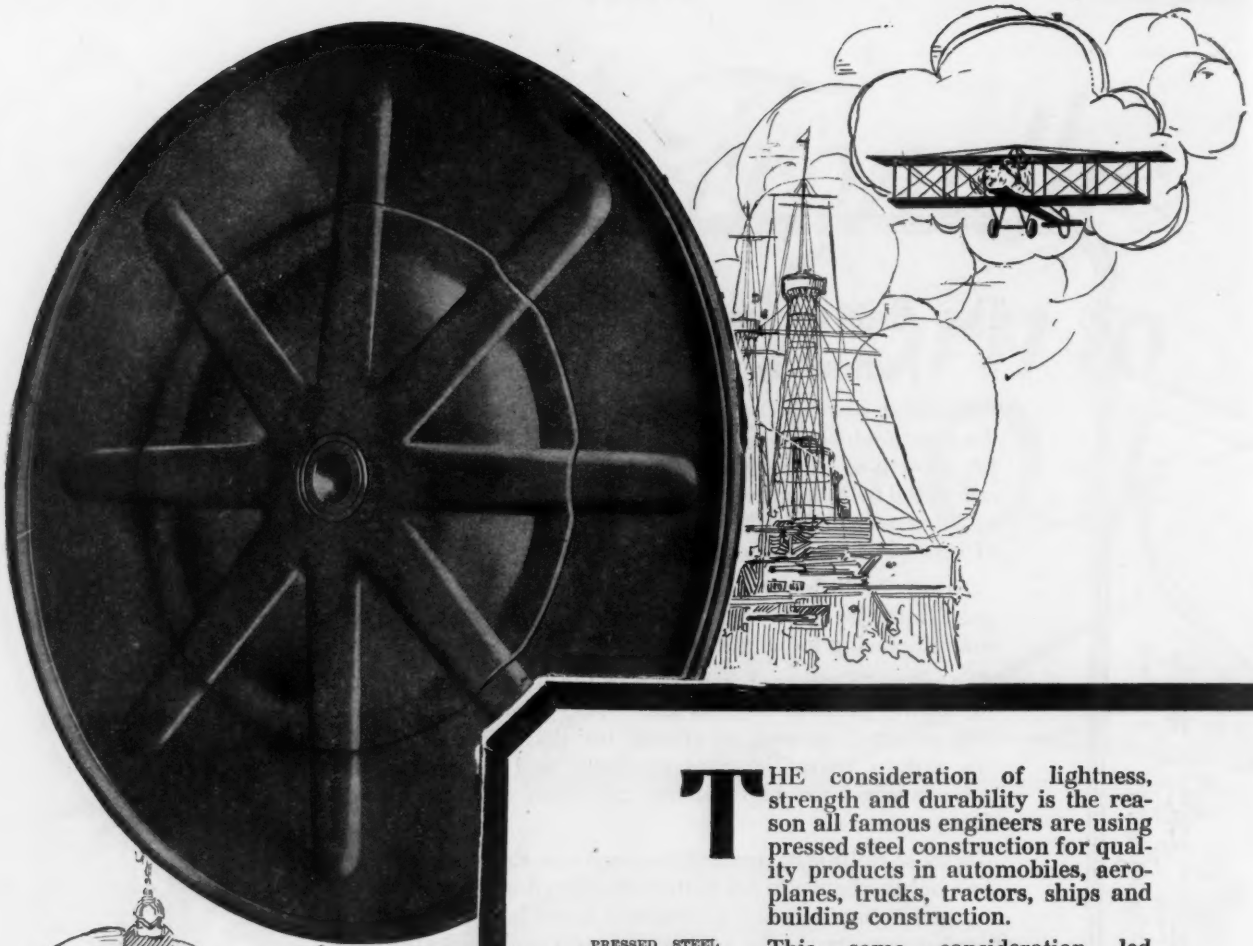
Largest Manufacturers of Loom Harness and Reeds in America

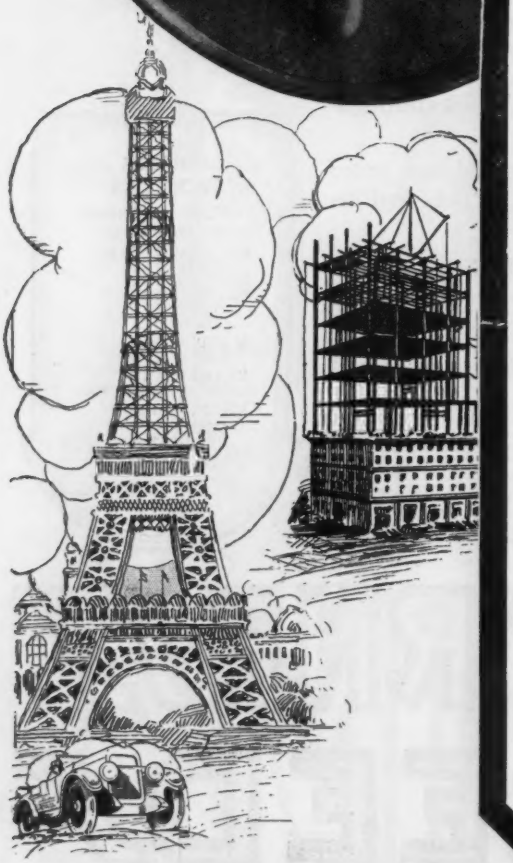
SOUTHERN REPRESENTATIVE:
GEO. F. BAHAN.
Charlotte, N. C.

EMMONS PRODUCTS

COTTON HARNESS
MAIL HARNESS
SELVEDGE HARNESS
REEDS
SLASHER AND STRIKING COMBS
WARPER AND LIECE REEDS
BEAMER AND DRESSER HECKS
MENDING EYES
JACQUARD HEDDLES
ETC.

LOOM HARNESS And REEDS





PRESSED STEEL PRODUCTS
Loom Beam Heads
Section Beam Heads
Adjustable Beam Heads
Elastic and Non-Elastic Webbing Beams
Webbing Beams
Silk Beams
Belting Beams
Jack Spools
"High-Speed" Braider Carriers
Braider Bobbins and Cops
"New Process" Drop Wires
Spools and Reels For Wire and Cable Industry.

THE consideration of lightness, strength and durability is the reason all famous engineers are using pressed steel construction for quality products in automobiles, aeroplanes, trucks, tractors, ships and building construction.

This same consideration led Mossberg Pressed Steel Corporation engineers to determine on pressed steel construction for their All-Steel Loom and Section Beam Heads.

Being lighter in weight than cast iron heads, it is obvious that all-steel heads save much time and labor in handling, as well as freight charges when beams are shipped.

Pressed steel construction guarantees a head that is absolutely unbreakable, nor will it warp, crack, bend or spring under the roughest usage. This not only saves the cost of replacement of broken heads, but it saves much time and

MOSSBERG PRESSED

MOSSBERG

Strength— with Lightness

Modern Efficiency Demanded
Pressed Steel Construction

labor in rewinding broken yarn from broken headed beams.

The Mossberg Pressed Steel Corporation is the only company specializing on pressed steel products for textile mills, and through such specialization and by devoting its entire time and facilities to one end, higher quality is attained at a lower cost, and many decided improvements are made possible from time to time through extensive study of the usage of pressed steel products in textile mills.

Our equipment and manufacturing processes are such that we can DUPLICATE in steel any cast-iron head now in use by any textile mill.

The Section Beam Head is reinforced with eight radial ribs over which is applied, under pressure, a large reinforcing plate which is also ribbed to fit over ribs of the head. A turned steel bushing is made with the diameter of hole to suit requirements.

This head is also made with smooth surface on the inside.

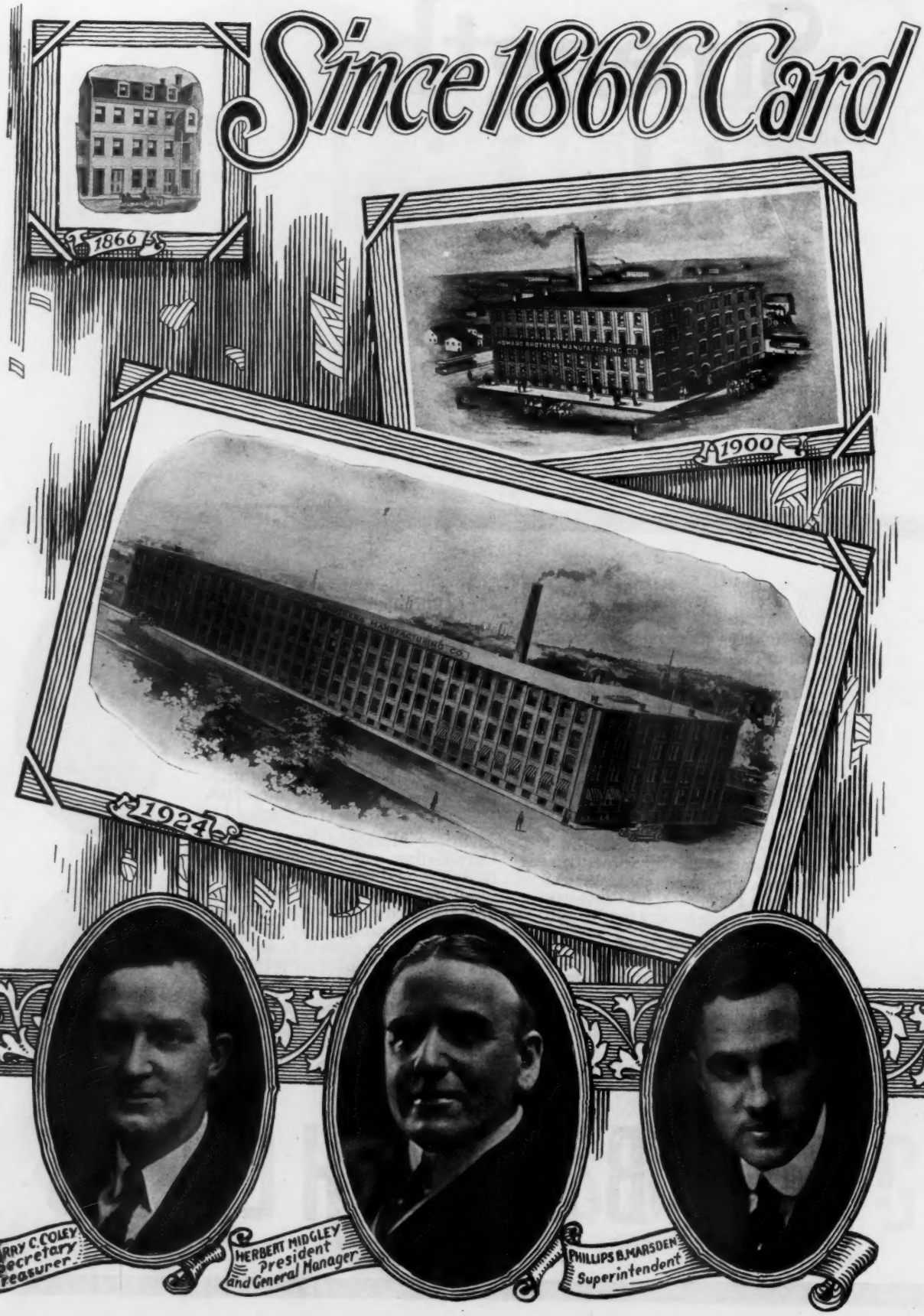
The Adjustable Loom Head is the only really adjustable beam head on the market. Steel clamp provides an adjustment up to ⅛ inch of the diameter of the center hole which permits the head to be clamped with a firm, binding grip. Fits a barrel of any diameter. Made in solid or split types.

All other Mossberg Pressed Steel Corporation products are perfect in design and construction. Made in all standard sizes. Our engineers will gladly co-operate with any mill without obligation in working out any particular problem in steel that may be required. Call on us any time.

Samples will be gladly sent on request.

STEEL CORPORATION, ATTLEBORO, MASS.

PRESSED STEEL CORP. **BEAM HEADS**


Since 1866 Card
1866
1900
1924
HARRY C. COLEY
Secretary
Treasurer
HERBERT MIDGLEY
President
and General Manager
PHILLIPS B. MARSDEN
Superintendent

Clothing Headquarters

An Organization Founded Upon Quality and Service!

IN 1866, Albert H. Howard and his two brothers formed a small company for the manufacture of machine card clothing. His foresight told him that the only way to build an ever-growing business and attain the goal he desired was to turn out only the highest quality products at the most reasonable price, and render his customers a square deal and faithful, prompt service. This was the basis of his business and in 1867, in a little three-story brick factory, he began the manufacture of card clothing, with a capacity of 150 square feet of machine card clothing, twelve dozen cotton cards, sixty dozen curry cards and three dozen wool cards per day. Only the best steel wire was used, as well as the highest quality cloths, leather, rubber and other materials.

The Howard Products were received so enthusiastically by the mills, and the demand increased to such an extent, that in 1892 it became necessary to build, and a large and more efficient factory was built. The ever increasing demand for Howard Quality Products made it necessary to build a large addition to the plant in 1909, which almost doubled the original floor space, and again in 1919 still another addition was completed, which brought the square feet of floor space to 70,000.

In 1898, Mr. Howard employed Herbert Midgley, an experienced card setter from England, whose valuable services led him to the position of Superintendent, and on Mr. Howard's death in 1916, was appointed President and General Manager, with Harry C. Coley, who began with the company in 1899 as office boy, as Secretary, Treasurer and Supervisor Over Sales. Phillips B. Marsden, with long experience in textile mills, was appointed Superintendent of the plant.

Year by year, since 1866, the demand for Howard Products has increased steadily, and this growth is attributed purely to quality products and unexcelled service. The customer comes first always, and he must be satisfied.

In addition to card clothing, a separate department is maintained for hand stripping cards, and fully 80% of the mills of this country are now using Midgley's Improved Hand Stripping Card. The wire heddle department is one of the largest of its kind in the country, capable of producing any length or size of wire, from the finest to the coarsest heddle required.

Today, the daily production of card clothing in the Howard plant amounts to 2500 square feet, which in comparison with the production in 1857, is ample proof that quality and service basis of the Howard foundation has received its reward.

TODAY, the textile world acknowledges Howard Brothers as Card Clothing Headquarters, and with extreme care and careful inspection methods exercised in the selection of cloths, leather, rubber and other materials, and only perfectly hardened and tempered steel wire, combind with the expert craftsmanship of every Howard workman, Howard Products guarantee you satisfaction and economy, first and last.

HOWARD PRODUCTS

CARD CLOTHING
WAPPER CLOTHING
WIRE HEDDLES
CYLINDER FILLETS
DOFFER FILLETS
HAND STRIPPING CARDS
STRIPPER FILLETS
BURNISHER FILLETS
EMERY FILLETS
STRICKLES

TOP FLATS RECOVERED

Complete equipment for recovering top flats and Lickerins has been established at our Branch Factory, 121 So. Forsyth Street, Atlanta, Ga. Prompt service is assured.

Extra sets of flats can be loaned to mills. A complete stock of Howard products are also carried at this plant ready for quick delivery.

HOWARD BROS. MFG. CO., WORCESTER, MASS.

SOUTHERN AGENT
E. M. TERRYBERRY
1126 Healey Bldg., Atlanta, Ga.

ASST. SOU. AGENT
GUY L. MELCHOR
121 So. Forsyth St., Atlanta, Ga.

HOWARD

Zemco-lite

TRADE MARK

Lighting Effectiveness

A bright, correctly diffused white wall and ceiling is the first requisite when selecting a mill white,—and the lighting effectiveness of Zemco-lite is unequalled by that of any other paint made. This superior quality is due solely to the prismatic set of the tiny particles of white Portland Cement which diffuse light in myriads of directions, flooding the interior with a soft white glow that minimizes shadows, is absolutely free from glare, and cuts down lighting bills most effectively.

And Zemco-lite STAYS WHITE. There is no oil in it to discolor. It is so finely ground that it hardens into a semi-flat enamel-like surface that is too smooth to catch lint or accumulate dust. It is naturally unaffected by moisture, steam, water, or acid fumes.

Frankly, the light-reflecting qualities of Zemco-lite will startle you, once you have it on your walls and ceilings. It is the one perfect mill white.

Many of the leading textile mills have adopted Zemco-lite as their standard wall coating.

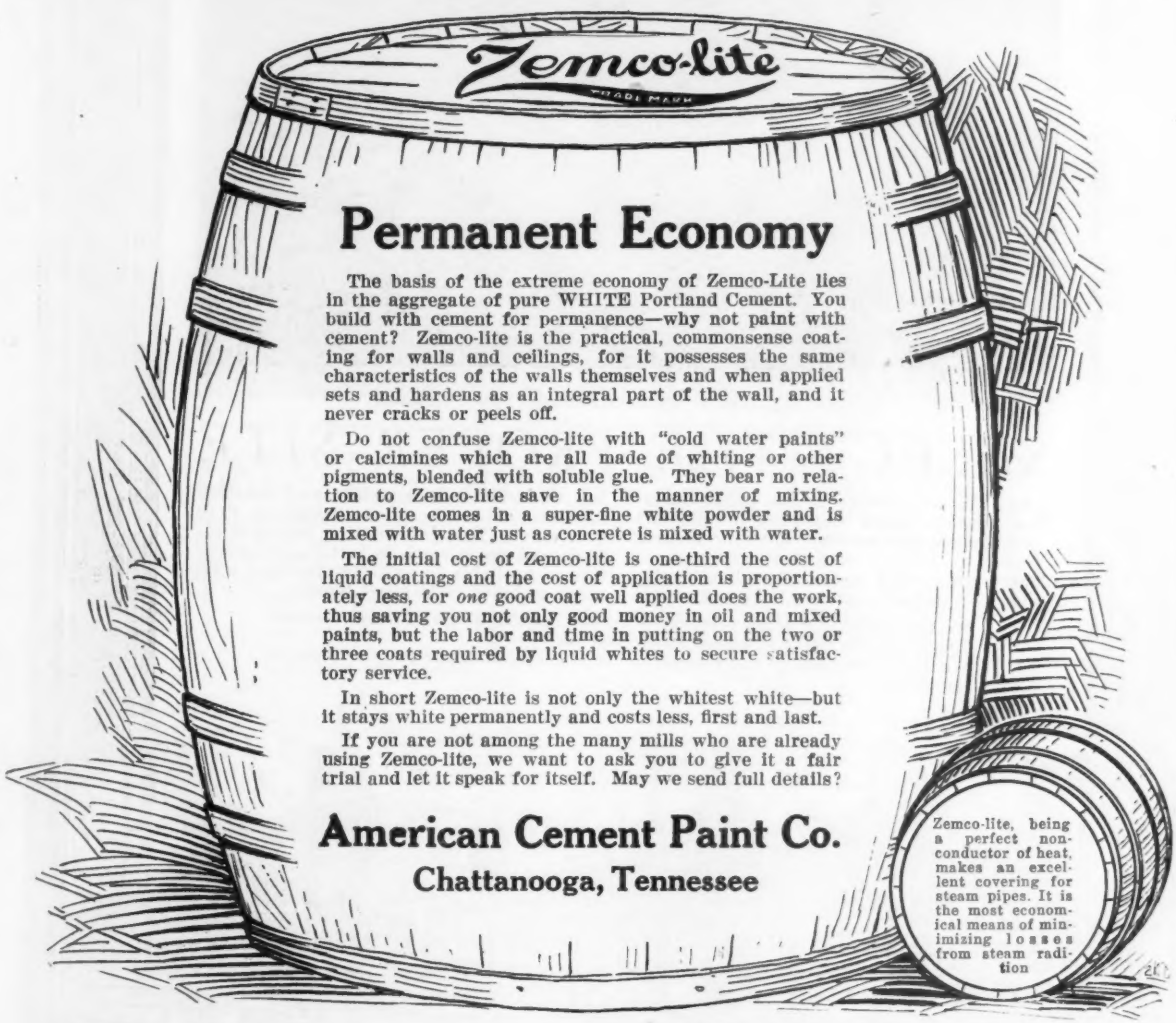
Zemcolite is also made in a variety of colors for every kind of interior or exterior painting. Color card will be gladly sent on request.

American Cement Paint Co.

Chattanooga, Tennessee

Like Cement —

The Cement Paint



Permanent Economy

The basis of the extreme economy of Zemco-Lite lies in the aggregate of pure WHITE Portland Cement. You build with cement for permanence—why not paint with cement? Zemco-lite is the practical, commonsense coating for walls and ceilings, for it possesses the same characteristics of the walls themselves and when applied sets and hardens as an integral part of the wall, and it never cracks or peels off.

Do not confuse Zemco-lite with "cold water paints" or calcimines which are all made of whiting or other pigments, blended with soluble glue. They bear no relation to Zemco-lite save in the manner of mixing. Zemco-lite comes in a super-fine white powder and is mixed with water just as concrete is mixed with water.

The initial cost of Zemco-lite is one-third the cost of liquid coatings and the cost of application is proportionately less, for *one* good coat well applied does the work, thus saving you not only good money in oil and mixed paints, but the labor and time in putting on the two or three coats required by liquid whites to secure satisfactory service.

In short Zemco-lite is not only the whitest white—but it stays white permanently and costs less, first and last.

If you are not among the many mills who are already using Zemco-lite, we want to ask you to give it a fair trial and let it speak for itself. May we send full details?

American Cement Paint Co.
Chattanooga, Tennessee

Zemco-lite, being a perfect non-conductor of heat, makes an excellent covering for steam pipes. It is the most economical means of minimizing losses from steam radiation

It Improves With Age—

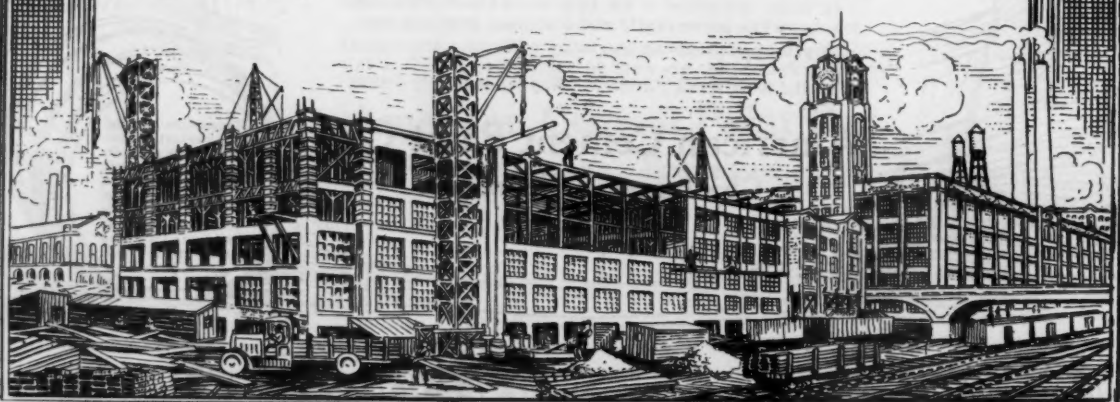
Aeroplane View of 20,000 Spindle Dixie Spinning Mills, Chattanooga

SELECT THE PROPER SITE

Upon its accessibilty to the great industrial factors, Labor and Power, Materials and Market, the success of every factory depends.

This organization in order to scientifically advise on proper southern factory location has undertaken a complete and detailed research of southern conditions as they now exist. This information which eliminates all guess work in factory site selection is available to any manufacturer who plans to build or to move South.

We have work now under progress in North Carolina, South Carolina, Georgia, Tennessee, Virginia, Alabama, Mississippi and Texas.
We invite confidential correspondence or a consultation as to your plans in the South.



ROBERT AND COMPANY
INCORPORATED
ARCHITECTS AND ENGINEERS ATLANTA, GEORGIA

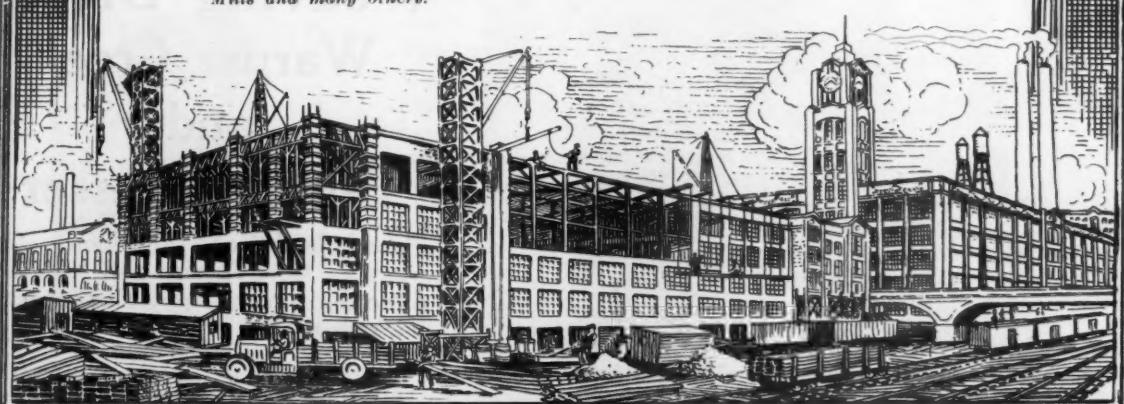
Birdseye View Showing 137,000 Spindle Columbus Plant of the Bibb Mfg. Co.

ERECT THE PROPER FACTORY

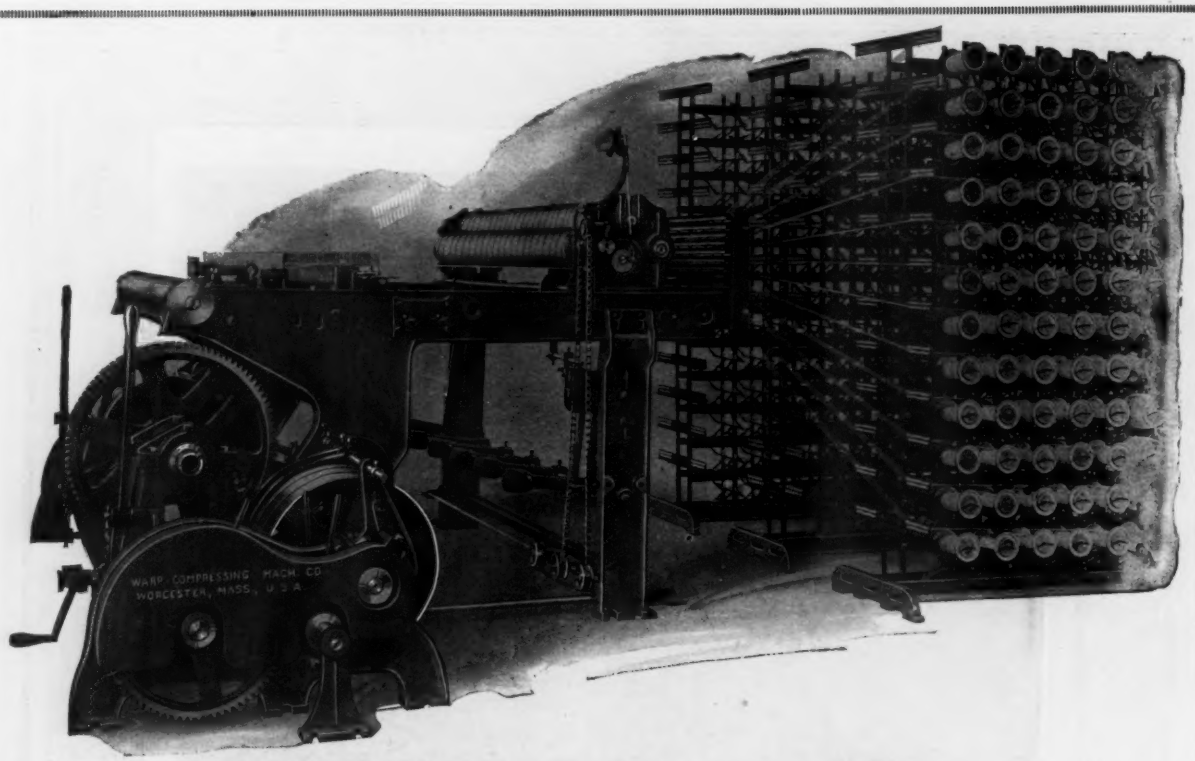
The profitable textile mill of the South must be planned with specialized knowledge of Southern Textile Conditions and the types of buildings and equipment suited to Southern conditions.

Our service covering a wide scope, includes reports, surveys, new building plans, machinery arrangements, mill village development, water power and steam power projects.

We number among our clients some of the largest Textile Mills in the South, such as, Bibb Mfg. Co., Standard Textile Products Co., Manville-Jenckes Co., U. S. Finishing Co., Wellington Sears and Co., Cannon Mfg. Co., Calloway Mills and many others.



ROBERT AND COMPANY
INCORPORATED
ARCHITECTS AND ENGINEERS ATLANTA, GEORGIA



Direct Beaming Outfits

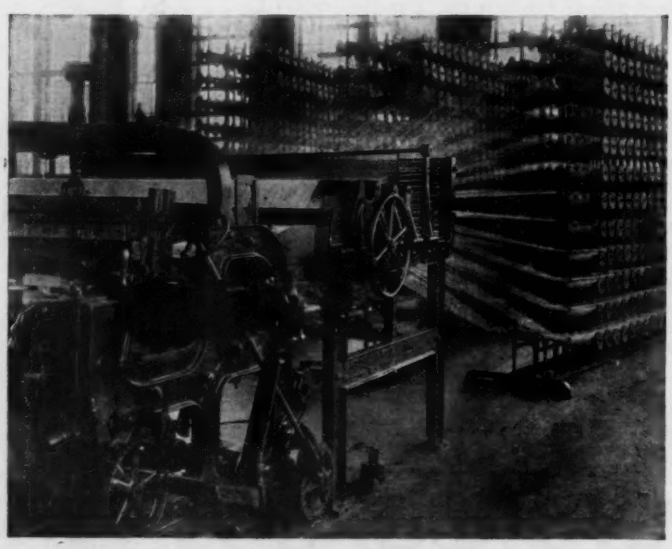
FOR PLIED YARNS

Built in Medium Heavy and Extra Heavy Weights

For—AUTOMOBILE TIRE FABRIC: Cord and Duck Warps. DUCK: SAIL-CLOTH: CAMEL'S HAIR PRESS CLOTH: WOVEN BELTING: STITCHED BELTING: CONVEYOR BELTING: ASBESTOS Brake Band and Clutch Lining, etc.

Beaming directly from your twister spools or cheese packages. UNIFORM TENSIONS.

30 to 50 per cent. more yarn per loom beam



Weaving Direct Warper Creel and Tension Dresser

Placed back of the loom, for weaving Cord-fabric and Specials directly from the spools or cheese packages.

HIGHEST EFFICIENCY TEST IN GOODS

Production Plus QUALITY

WARP COMPRESSING MACHINE CO.-:-

Worcester, Mass. U. S. A.

Representative:* F. W. KIESSLING, *Worcester, Mass.

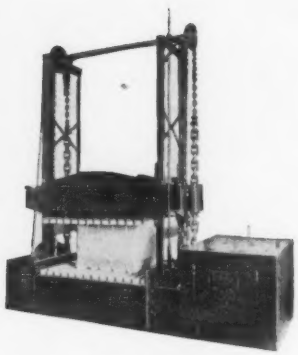
The Largest and Most Complete Line On The Market

ALL STEEL ECONOMY FIRE PROOF

"Economy" Balers Always Pay for Themselves

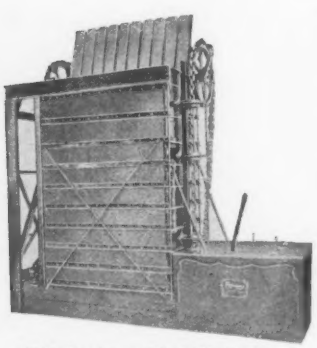
A Press for Every Baling Purpose

Better Bales In Faster Time and At Less Cost



CLOTH PRESS
Heavy Duty No. 258—Platen 50 x 36

Develops tremendous pressure, for baling for export or domestic shipment of duck, khaki, osnaburgs, sheeting, print cloths, drills, shirtings, etc. Requires only 1 minute of motor operation to make a bale. Maintains maximum pressure indefinitely. Platen travels as low as within four inches of platform. Equipped with 40 H.P. electric motor and hand forged Swedish Chains. Entirely self contained no foundation, pit or shafting required.



WASTE AND DYED RAW STOCK PRESS—Direct Motor Driven

Produces square cornered bales 54 inches long, 27 inches wide, by about 40 inches deep of average waste weighing 500 lbs. Operated by one man. Top opens automatically ready for filling instantly. Length of stroke unlimited. Any third dimension of bale desired. Automatic safety shut-off instantly stops press when a certain pre-determined pressure is exerted which protects motor, press and operator. Fool proof. Positive. Non-breakable chains which roll around pocket wheels. Power is developed by gears and not screws. No Sag doors.

An enviable reputation has been won by "Economy" Presses as being the fastest and most efficient presses as well as the sturdiest and nearest foolproof of any on the market. "Economy" superiority is the result of over a quarter of a century's experience in building baling presses exclusively. Patented features have been developed to make every detail of every "Economy" Press perfect. But an "Economy" Press costs no more in first cost, and a great deal less to operate, maintain and especially to install.

Regardless of the type of "Economy" Press you select, depend on the fact that it will pay for itself in time, labor and storage space saved and in better, more salable bales produced. There are more satisfied users of "Economy" Balers than nearly all other all-steel presses combined, and many thousands of dollars have been saved by these users.

Real service goes with every "Economy." Service branches in all important centers protect you against costly tie-ups.

When you buy an "Economy" you buy long, continued satisfactory service.

Catalog gladly sent on request.

Economy Baler Co.
Dept. C
Ann Arbor, Mich.

HAND WASTE BALER

An all-steel hand operated press for heavy, fast baling producing standard cotton bale 54" x 27" any dimension to 45". Height of chamber 5 ft. Produces tremendous pressure making heavy, compact bales of comber noils and card strips from 400 lbs. and heavier. Strictly a one-man press. Operated by means of 54-inch lever and special mechanism a 150-lb. man is able to exert 10,000 lbs. upon the bale without jumping lever. Equipped with famous Economy features such as long stroke, quick return platen, automatic self-opening top, non-breakable chains, no-sag doors, etc.

TOGGLE YARN PRESS

Makes standard export bale 24" x 36" x 36". 400 lbs. Baling chamber 5 feet high. Operates rapidly. Has a longer stroke plunger. Arms fastened solidly to compressing platen near the ends and cannot tip up at ends. Arms are not pivoted in middle, thus giving entire strain on the arms and end thrust only. Standard worm gear and worm attached to shaft that operates the pinion between two racks which in turn pulls toggle arms, thus pressure is held at all points of platen stroke. Compressing platen is raised by simply reversing motor. Doors as well as sides swing out independently. Four doors locked by two locks at opposite corners of chamber. No screws or nuts to wear out. Strong and durable.

If

You have sold your waste to us

WE THANK YOU

If you have not sold your waste

YOU WILL THANK US

for the advantageous contract we can offer.

WE BUY ALL GRADES OF TEXTILE WASTE

VALLEY WASTE MILLS

(Hillside Cotton Mills, OWNERS)

LAGRANGE, GA.

There is Real Need for Adequate, Everwear Equipped Playgrounds

Your city must care for the play requirements of its children. Alleys and streets are poor training ground for tomorrow's citizens but adequately equipped public playgrounds teach loyalty, obedience, cooperation, sacrifice and fair play, admirable and essential qualities for your successors.

Everwear Steel Playground Apparatus

furnishes each child with just the kind of fun which most appeals. At the same time he is breathing clean outdoor air, developing the body, building character.

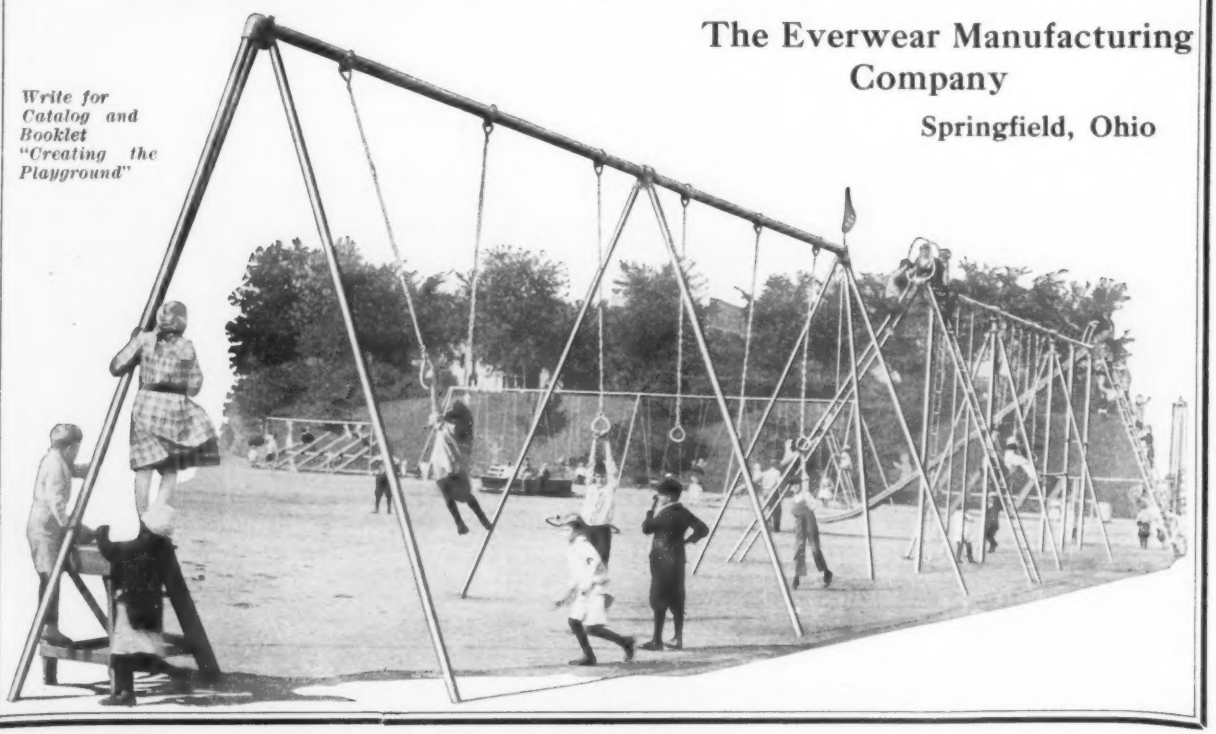
Everywear is safe.
It looks neat and attractive.
Stands the wear and tear of continuous service. Has many exclusive patented safety features.

Everwear Will Make Your Playground Appropriation Last Longer

Write for Catalog and Booklet "Creating the Playground"

The Everwear Manufacturing Company

Springfield, Ohio

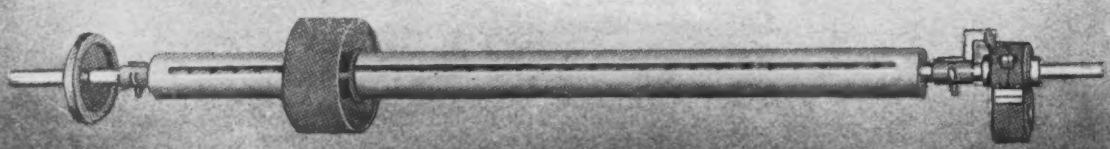


ROY'S IMPROVED COTTON CARD GRINDER

ESTABLISHED ≈ 1868

Only plant in the world devoted solely to Grinding Machinery for Textile Mills ≈

B. S. ROY & SON CO. MADE IN AMERICA TEXTILE GRINDING MACHINERY WORCESTER, MASS. U.S.A.



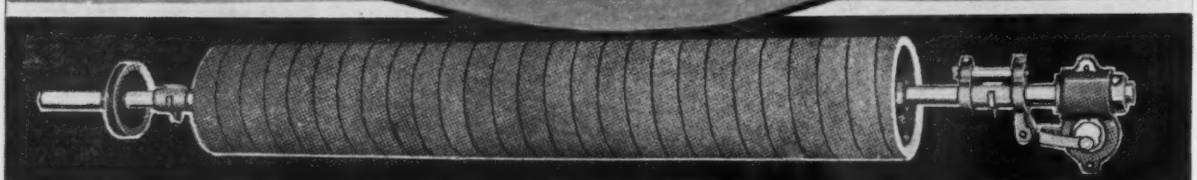
HAVING devoted our entire efforts for half a century to building Grinding Machinery for Textile Mills, it is but natural that this specializing should result in a superior product.

Then, too, it is the only plant in the world that confine themselves to this one feature.

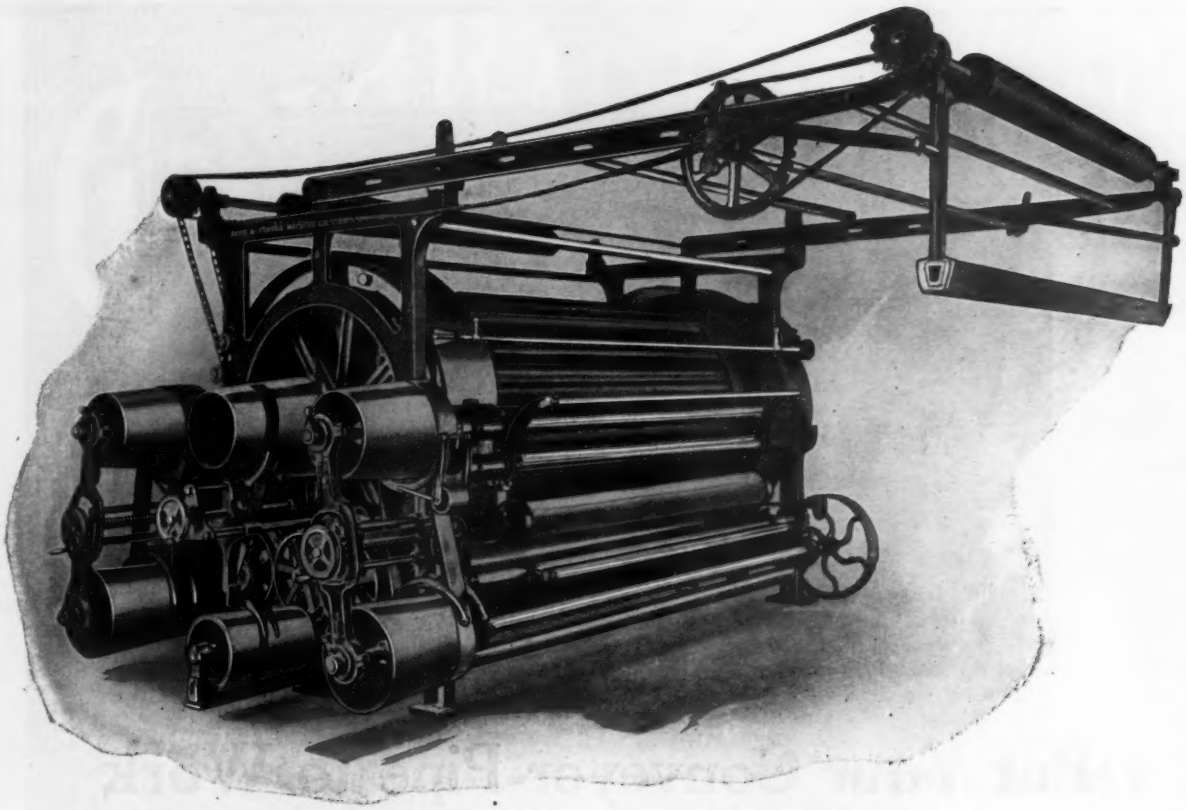
The ROY Improved Card Grinders, as illustrated, are our latest machines for grinding cotton cards. Many hundreds have been installed. Every one has given complete satisfaction.

Write today for information and prices. Circular sent on request.

Repair work given immediate attention.



B.S.ROY & SON CO. WORCESTER, MASS.



36 ROLL DOUBLE ACTING NAPPER FOR COTTON GOODS

THE DAVIS & FURBER MACHINE CO.

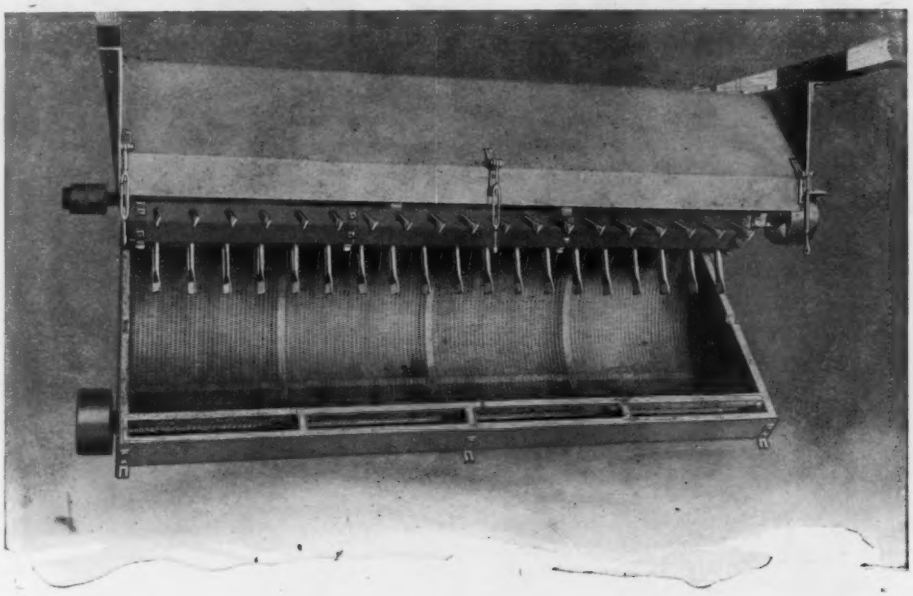
OF NORTH ANDOVER, MASSACHUSETTS.

ESTABLISHED 1832

For 91 years manufacturing the highest type of Textile Machinery for Wool, Worsted, Cotton Waste, Jute, Mohair, Asbestos, Flax Waste, Silk Waste and Shoddy.

Its Cards, Mules, Nappers, Pickers, Dusters, Tape Condensers, Dressing Machinery, Card Clothing and Napper Clothing are the standard for America and are constantly being exported.

WORKS OF THE DAVIS & FURBER MACHINE CO.



Put Your Conveyor Pipe to Work

You can give your cotton a thorough cleaning, opening and aerating, while it's being conveyed from the bale breakers to the picker room. The Murray Cotton Cleaning and Aerating Machine forms a part of the conveyor pipe, and vastly improves the stock before it is fed to the pickers.

The "Murray" takes up very little extra space since it can be hung from the ceiling. Its supply of cotton is drawn through it by the suction of the conveyor pipe fan, no additional fan or increased draft being necessary. A further economical feature is the fact that the "Murray" requires practically no attention since the dirt is automatically disposed of through a chute at one end.

Handles 2,500 Lbs. Hourly.

2,500 pounds of cotton per hour can be cleaned, opened and aerated in the Murray machine at a power expenditure of only 3 to 5 H.P. The stock is given a thorough treatment by 114 revolving arms.

The Bowling Green Spinning Mills write us stating "The Opener we purchased from you is giving entire satisfaction in every way. In fact we think it is a wonderful machine."

THE MURRAY COMPANY, ATLANTA, GA.

Northern and New England Sales Representatives:
Aldrich Machine Works
P. O. Box 132, Providence, R. I

Carolina Sales Representatives:
Carolina Specialty Co.
Brevard Court
Charlotte, N. C.

The Murray (PAT. PENDING)
COTTON CLEANING AND AERATING MACHINE

COTTON WELL OPENED IS HALF SPUN

Growth A Tribute To Worth

1883 1924

THE reputation of our "Superior" quality products established forty years ago has been maintained through the years, until today our "High Grade" products are demanded and used by the leading textile mills throughout the entire country. The combined organizations at the main plant in Lawrence, Mass., together with three big stock plants in Maine, New Hampshire and Vermont, altogether operating hundreds of skilled workmen, each one of whom takes pride in upholding the reputation established forty years ago, assure textile mills of the most dependable and economical products of their kind to be obtained.

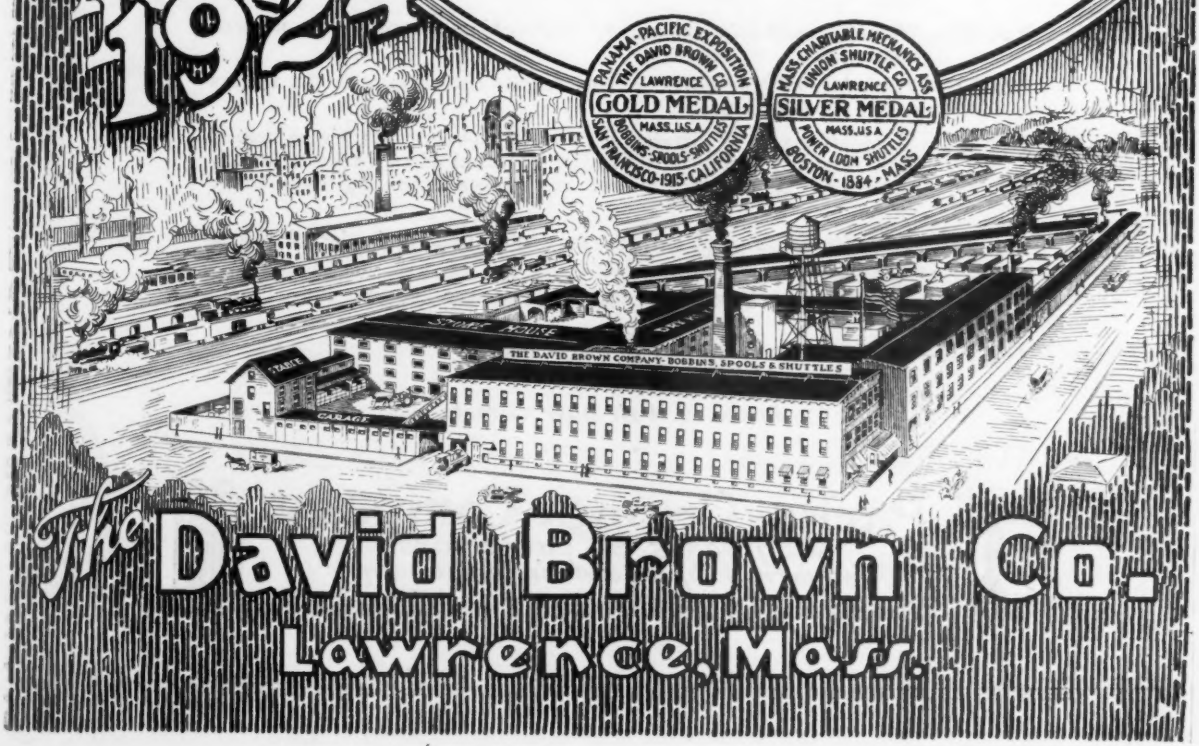
We specialize in complete new mill equipment of Bobbins, Spools, Shuttles, Skewers, etc.

Our "High Grade" Products include:—Plain and Automatic Loom Shuttles, Warp Bobbins, Filling Bobbins, Card Room Bobbins, Plain and Metal Head Warper and Twister Spools, Automatic Loom Bobbins, etc. We particularly call attention to our bobbins and spools fitted with our special metal shields of all types and kinds, also to our enamel finish in any color.

THE DAVID BROWN CO.

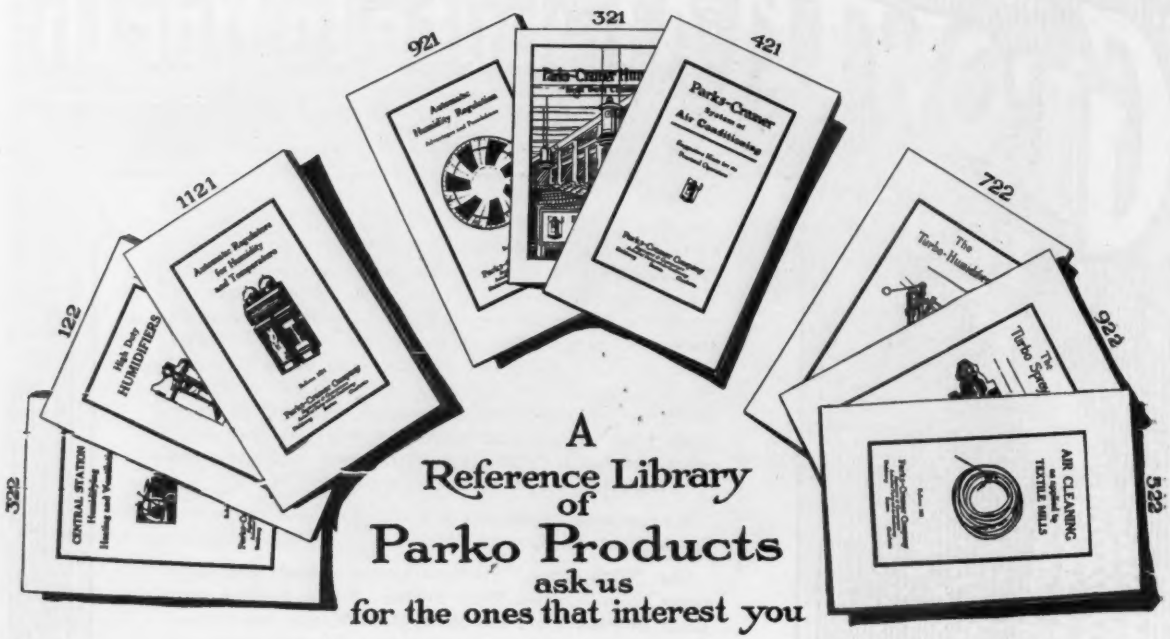
"High Grade" Bobbins, Spools and Shuttles

David M. Brown, President — LAWRENCE, MASS. — George Gibson Brown, Treasurer



The David Brown Co.

Lawrence, Mass.



A
Reference Library
of
Parko Products
ask us
for the ones that interest you

No. 322—*Air Conditioning by Central Station*—Heating, Ventilating, Cooling and Humidifying from central source. Yarn conditioning apparatus.

No. 122—*The High Duty Humidifier*—The first one, its characteristics and advantages.

No. 1121—*ParkSpray Humidity Regulator*—How it works and what it does.

No. 921—*What Automatic Humidity Regulation* means to the modern textile mill.

No. 321—*The place of Humidity in the Textile Industry* with the factors which govern its use.

No. 421—*Suggestions to the manufacturer* or his operatives, giving helpful hints for the practical operation of humidifiers in each factory operation. A classification of experiences extending over many years.

No. 722—*The Turbo Humidifier*—its particular uses and adaptability to existing conditions.

No. 922—*The Turbo Sprayer* for injecting moisture or oil into fibrous materials.

No. 522—*Air cleaning* as applied to textile mills.

Profit by High Duty Climate

Parks-Cramer Company
Engineers & Contractors
Industrial Piping and Air Conditioning
Fitchburg Boston Charlotte

ATLANTA

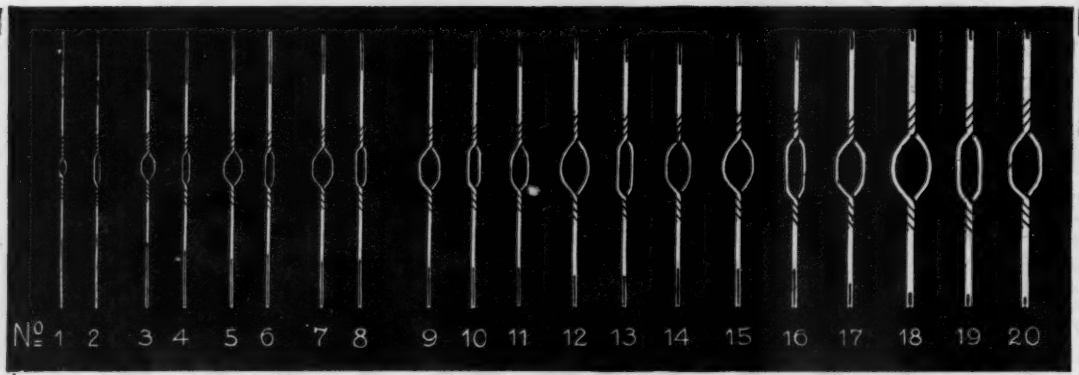
HARNESSES AND REEDS

"Quality and Service That Satisfies"

Atlanta Harness & Reed Mfg. Co.

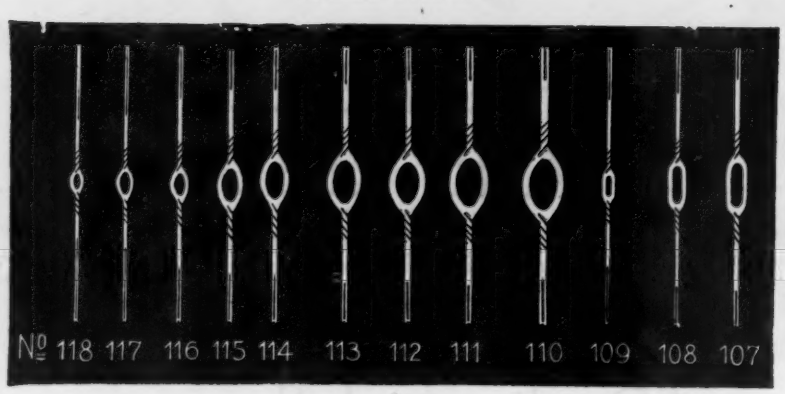
ATLANTA, GA.

P. O. Box 1375 **Telephone Main 0517**



ORDINARY WARP EYES

SWISS TWIN WIRE HEDDLES



SWISS TWIN WIRE HEDDLES

INSERTED STEEL MAILS

SWISS TWIN WIRE HEDDLES

HEDDLE FRAMES
MILL SUPPLIES

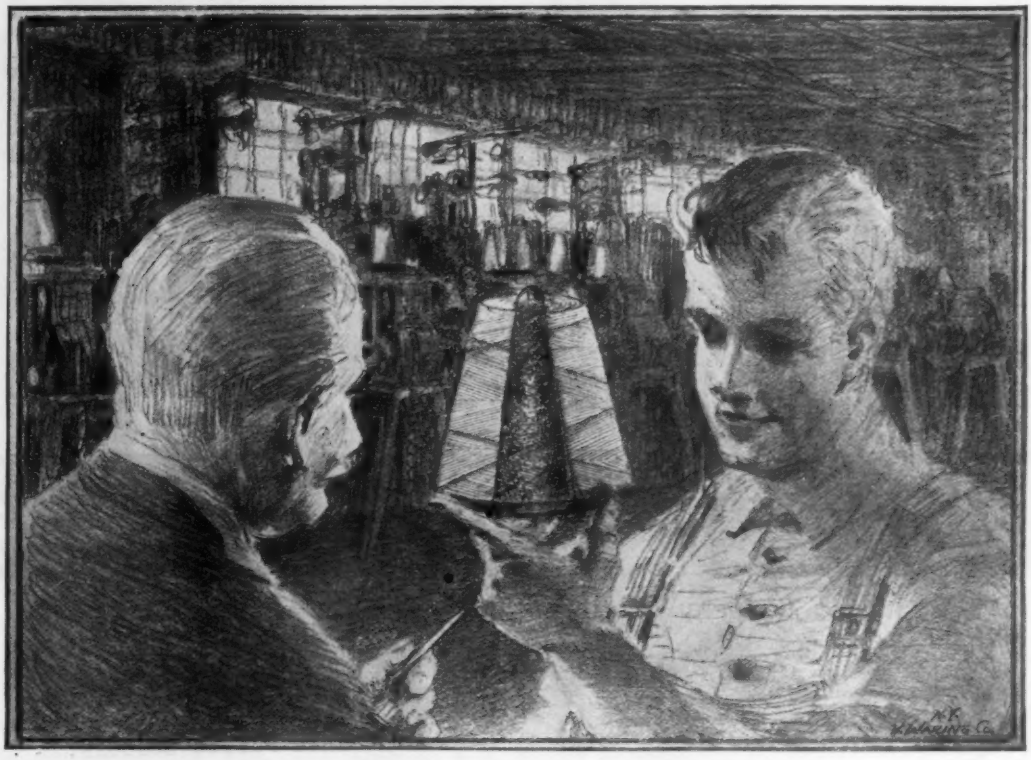
Paper Mache Spools and Bobbins
Drop Wires—Pick Forks

J. J. REUTLINGER

160 Fifth Ave. **New York City**

Southern Representative: **RALPH M. LANE,** P. O. Box 1375, Charlotte, N. C.

Eastern Representative: **H. J. SCHULLER,** 163 Meridian St., East Boston, Mass.



"Thank the Cones for your Production Record, Mac; they can make it, or break it:"

The last few laps of every package are saved by the Round Point of our *"Yarnsaver."*

"Cones that are uniformly perfect in fit and balance, prevent the winding flaws that stop our machines, waste our yarn, and pile up 'seconds' on the stock sheet."

"Learn to 'see through' to the Cone and make your requisitions accordingly for the cones that are *consistently perfect*—"

"SONOCO"

Cones and Tubes

Sonoco Products Co., Manufacturers

General Offices and Factory, Hartsville, S. C.

Successors to Southern Novelty Co.

Eastern Office, 410 Olympia Building, New Bedford, Mass.

WILLIS A. SUTTON, SUPERINTENDENT — H. REID HUNTER, ASSISTANT SUPERINTENDENT — MARY W. POSTELL, ASSISTANT SUPERINTENDENT — R. L. McCULLOUGH, BUSINESS MANAGER

OFFICE OF
BOARD OF EDUCATION
AND
SUPERINTENDENT ATLANTA PUBLIC SCHOOLS
ATLANTA, GA.

Southern Theatre Equipment Co., Atlanta, Ga.
Gentlemen:--Regarding the educational value of the motion picture in public schools, I wish to call your attention to the following points:
1, 2, 3 and 4--(See previous ads.)
5,--PICTURES IN GENERAL MAKE A FAR MORE VIVID IMPRESSION ON THE MIND THAN DO WORDS, because of their completeness of detail, and of their resemblance to material experiences; also because of their vividness these impressions are lasting.

A letter from a man who knows

You may use any or all of this letter as you desire.
Very truly yours,
Joe W. Coffman
Supervisor, Visual Instruction,
Atlanta Public Schools.

VISUAL EDUCATION with the motion picture has already proven its value in city schools, and it will prove of even greater value in village and community schools because it accomplishes even greater results with less time and less experienced teachers.

Through the courtesy of Mr. Coffman, we are presenting each month in paragraph form, parts of a very enlightening letter which he has written us, and through Mr. Coffman also, we are able to give our textile mill friends valuable help and suggestions regarding the use of this system in community school work, the selection of the proper films, in fact the solution of every problem which may present itself.

Our service to textile mills is the result of years of experience, and we have installed Powers Motion Picture Projectors and theatre auditorium equipment in over 60 Southern mills. Whether it be a visual education system or complete motion picture theatre equipment, including screens, chairs, cooling systems, etc., we are ready to take the problem off your hands and turn the system back to you ready for operation.

May we present our special proposition to you?

Southern Theatre Equipment Company
WILLIAM OLDKNOW, President.
100 WALTON STREET ATLANTA, GEORGIA
THREE TWENTY-EIGHT CALIFORNIA ST. OKLAHOMA CITY, OKLA.
1907 COMMERCE ST. DALLAS, TEXAS

QUALITY

ROLLER CLOTHS

Roller Cloth made by Philadelphia Felt Company has the distinction of having the greatest demand from the most up-to-date mills of any roller cloth made. It always renders perfect satisfaction and produces perfect results simply because it is made of the right material, with just the right cushion and uniformity of surface.

CLEARER CLOTHS

Clearer Cloth of Philadelphia Felt manufacture has the same high quality of materials. It has a strong thick nap that does not pull out and its uniform length is such that the rolls are cleared entirely of short fibre. This cloth is the most perfect and economical cloth you can secure for your clearer rolls.

SLASHER CLOTHS

Slasher Cloth made by us can always be depended upon to be of sufficient cushion and porous enough to thoroughly force the sizing into the yarn. It is being used with perfect results on slashers in numbers of the country's leading mills. It not only gives the desired results, but it is more economical in the long run.

PROMPT SERVICE

A letter, telegram or phone call to our Greenville office will assure your order being given rush attention, and shipment made promptly on its receipt.

Why not order a small trial supply of cloths to meet your requirements today?

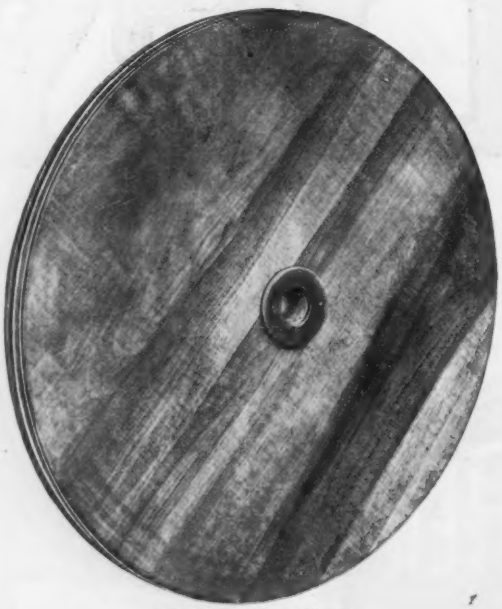
Samples and prices gladly sent on request.

PHILADELPHIA FELT CO.

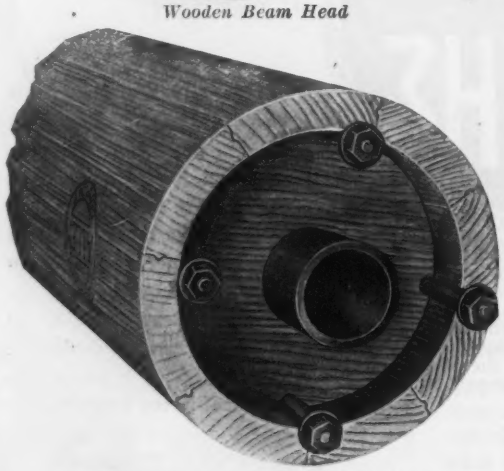
FRANKFORD, PHILADELPHIA, PENNSYLVANIA

FITZ LEE PUTNEY, Treasurer

M. C. SANDERS, SOUTHERN SALES AGENT, GREENVILLE, S. C.



Wooden Beam Head



Combination Section Beam

Wooden Loom Beam Head with Brake Drum

Old Style Section Beam

ALLEN COMPANY

PATENT

WOODEN BEAM HEADS SECTION BEAMS and COMBINATION SECTION BEAMS

Allen Company Wooden Beam Heads are practically unbreakable, insuring longer life, they are lighter in weight which insures ease of handling and also a great saving in freight charges. Out of the thousands in use, not one complaint has been received of one broken causing loss of yarn or expense of rewinding.

Constructed of three pieces of selected scientifically kiln dried Beech lumber, securely glued together under heavy hydraulic pressure. Accurately turned on centers. Protected on outside diameter from splintering and general wear by cold shaped upset steel tires. Finished by a water-proofing process and painted any desired color.

The Combination Section Beam has met requirements long demanded in that it is stronger, reduces loss from bent shafts, and is better adapted for storage and shipping of yarn. It is stronger, being built around the pipe and not the shaft itself. Inner heads, being driven on pipes under great pressure, are thus secured without use of wedges or metal flanges. Staves of barrels are fastened to inner heads by countersunk screws. Heads are held on barrels by means of stay-bolts, passing through entire length of beam. Leverage on heads is lessened in so much as point of contact with beam is farther from center. Shaft pases through pipe, is accurately centered and held in pipe by taper nuts. If bent, release nut, remove shaft, straighten, then return to pipe. By removing shaft, loaded beams can be stood on end, making great saving in space for storage. Furnished complete with shaft, and can be used with either wooden or metal heads.

In the Old Style Section Beam shown above, shafts of rolled steel instead of soft steel as commonly supplied, is used, thus greater strength is insured. Inside heads milled and forced on shaft under great pressure. Staves secured to inner heads by screws, holes being bunged to insure smooth surface on barrel. May be used with any make of head Can also be furnished with lengthwise stay bolts to hold the heads on.

Allen Company Products, tried under your own conditions, will prove profiable investments. Catalog showing the complete line gladly furnished on request. Ask for it today

Allen Company, New Bedford, Mass.

Also Manufacturers of

Top Beams, Beam Trucks, Box Trucks, Braider Reels, Lug Sticks, Mechanics Benches, Overseers Desks, Cabinets and other wooden specialties.

SCOTT TESTERS

This cut shows one of our Combination Yarn and Fabric Testers equipped with Autographic Recorder. This attachment automatically draws a line on ruled paper giving both the strength and stretch readings. By its use, a clearer understanding of these qualities of the material is obtained as the whole test is given in one line.

May we send you the Catalogue?

HENRY L. SCOTT & CO.

101 BLACKSTONE ST. PROVIDENCE, R. I.

More Fame for Two Famous Products

At the Boston Show there were two of the country's leading loom manufacturers who exhibited their products,—Stafford Co. and Hopedale Mfg. Co. On some of these looms **Flat Steel Heddles** and **Universal Frames** were used.

This merely added more fame to two already famous products—considering—the most difficult weaves, such as *PILLOW TUBING*, *DENIM* and *STRIPE MADRAS* shirting goods were made, proving the merits of *quality production* on fabrics where formerly only cotton twine or round wire type Harness has been used.

If you are still using the old-fashioned heddles and frames, we would like the opportunity of proving to you the results you can be assured of by the use of Flat Steel Heddles and Universal Frames.

Send us a few of the heddles you are now using, together with samples of your yarn and fabric, and we will mail you some samples that you can make some surprising tests with. Do it now before you forget—you won't regret it.

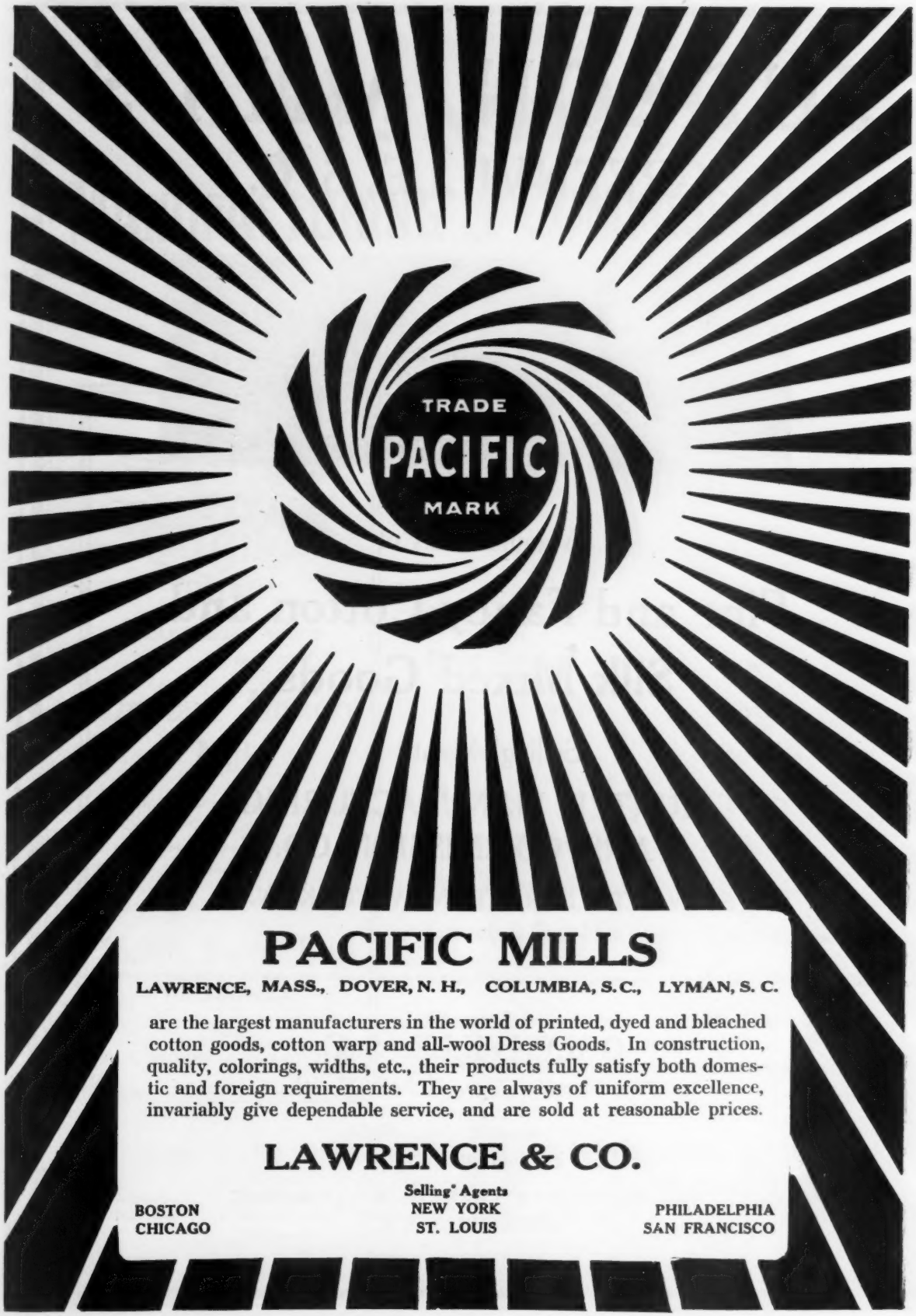
STEEL HEDDLE MFG. CO.

GREENVILLE PHILADELPHIA PROVIDENCE

SOUTHERN OFFICE: 509 MASONIC TEMPLE, GREENVILLE, S. C. HAMPTON SMITH, MANAGER.

FLAT STEEL HEDDLES

AND UNIVERSAL FRAMES



PACIFIC MILLS

LAWRENCE, MASS., DOVER, N. H., COLUMBIA, S. C., LYMAN, S. C.

are the largest manufacturers in the world of printed, dyed and bleached cotton goods, cotton warp and all-wool Dress Goods. In construction, quality, colorings, widths, etc., their products fully satisfy both domestic and foreign requirements. They are always of uniform excellence, invariably give dependable service, and are sold at reasonable prices.

LAWRENCE & CO.

Selling Agents

BOSTON
CHICAGO
NEW YORK
ST. LOUIS
PHILADELPHIA
SAN FRANCISCO

JUDSON MILLS
GREENVILLE, S. C.

Manufacturers of

Fine and Fancy Cotton and Silk Mixed Goods

Selling Agents—

HUNTER MANUFACTURING AND COMMISSION CO.

58 WORTH STREET, NEW YORK, N. Y.

GREENVILLE. S. C.

The Textile Center of the South

Ideal industrial sites available.
For information write

THE GREENVILLE CHAMBER OF COMMERCE
GREENVILLE, S. C.

HUNTER
MANUFACTURING & COMMISSION CO.

58-60 Worth St., New York City

DURABLE DURHAM TRADE MARK HOSIERY

SOLE SELLING AGENTS
for the

Durham Hosiery Mills

Fifteen Modern Plants in North Carolina Converting Raw Materials Into Finished Hosiery.

DAILY CAPACITY EXCEEDS

25,000 Dozen Pairs of Hosiery

FOR
MEN, WOMEN AND CHILDREN

SELLING AGENTS FOR

SOUTHERN COTTON MILLS

Fabrics for Home and Export

Sheetings	Plaids
Print Cloths	Denims
Drills & Twills	Shirtings
Ducks	Cheviots
Osnaburgs	Chambrays
Piques & Gabardines	Tickings
Fine Combed Fancies	Hickories
Cotton & Silk Mixtures	Cottonades
Outing Flannels	Cotton Suitings
Mottled Flannels	Bedspreads
Ginghams	Crashes

DOMESTIC BRANCH OFFICES

Boston, Philadelphia, Baltimore, Chicago, Cleveland, Kansas City, Atlanta, San Francisco, St. Louis, Greensboro

FOREIGN BRANCH OFFICES

Buenos Aires, Argentine; Caracas, Venezuela; San Juan, Porto Rico; Baranquilla, Colombia; Curacao, D. W. I.; Santiago, Chile; Havana, Cuba

CHARLOTTE, NORTH CAROLINA

The Industrial and Commercial Center of the New South

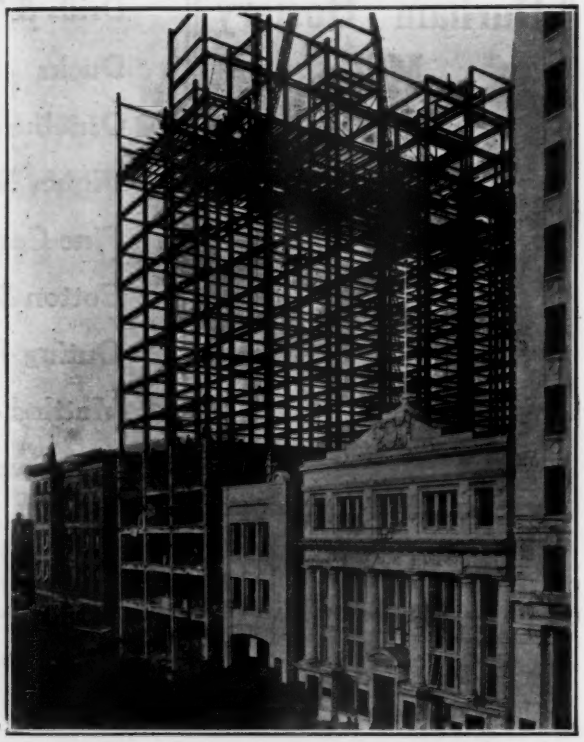
HOTEL CHARLOTTE
To Be Opened About Feby. 15, 1924.

Because of its ideal location, splendid transportation facilities and other advantages, CHARLOTTE has come to be recognized as the center of the new Industrial South.

The section surrounding CHARLOTTE has led the entire country in textile development during the past decade and a half, because of cheap, convenient, hydro-electric power.

CHARLOTTE is headquarters for, and the center of development of, the Southern Power Co., from whose transmission line power is derived to drive 5,250,000 Spindles.

JOHNSTON TEXTILE BUILDING
Now Under Construction.



The Piedmont South, has not been confined to textiles. Cotton seed products, tobacco, furniture, minerals, and lumber are products produced and distributed from this section.

The City and territory offers unbounded opportunities in manufacturing, agriculture and mining. Equal opportunities are offered to mercantile establishments.

The population of CHARLOTTE'S trading territory is denser than that of any similar territory in the Southeastern States.

For Information Address

Charlotte Chamber of Commerce
Charlotte, North Carolina

White heavy duty truck in the service of The Cotton Warehouse Co., Atlanta.

White Trucks

Investment in White Trucks is secured by years and miles of uninterrupted transportation far beyond the average limits of truck life. You will find White Trucks doing a full day's work with 100,000, 200,000 and even 300,000 miles and more behind them. Owners' records published annually of Whites of all models that have gone 100,000 miles and more total more than two thousand trucks—with many more unrecorded. No other truck manufacturer has ever approached such convincing proof of truck durability.

THE WHITE COMPANY

Cleveland

23 YEARS OF KNOWING HOW

THE SATISFACTION

derived from building a truly high grade motor car is similar to WORK WELL DONE in the Textile Industry.—That feeling of pride as a reward for our honest endeavors.

The 1924 ANDERSON ALUMINUM SIX is the product of five generations of fine coach-building of which we are justly proud.

These "Coachbilt" ALUMINUM closed bodies are regular Winter Pullmans. There is the marked absence of the usual rumbling and other body annoyances commonly found in cheap construction.

Take the new COACHBILT COUPE for instance—The Master coach work bespeaks of luxury and refinement. This Coupe is giving complete satisfaction in the hands of professional men and men of big affairs, especially among those who drive their own cars.

Among the many other attractive features for 1924 are the new Balloon Tires and Four-wheel brakes. These are worthwhile comforts and conveniences.

Improved comfort cannot be found in cars double the price of Anderson Aluminum Sixes.

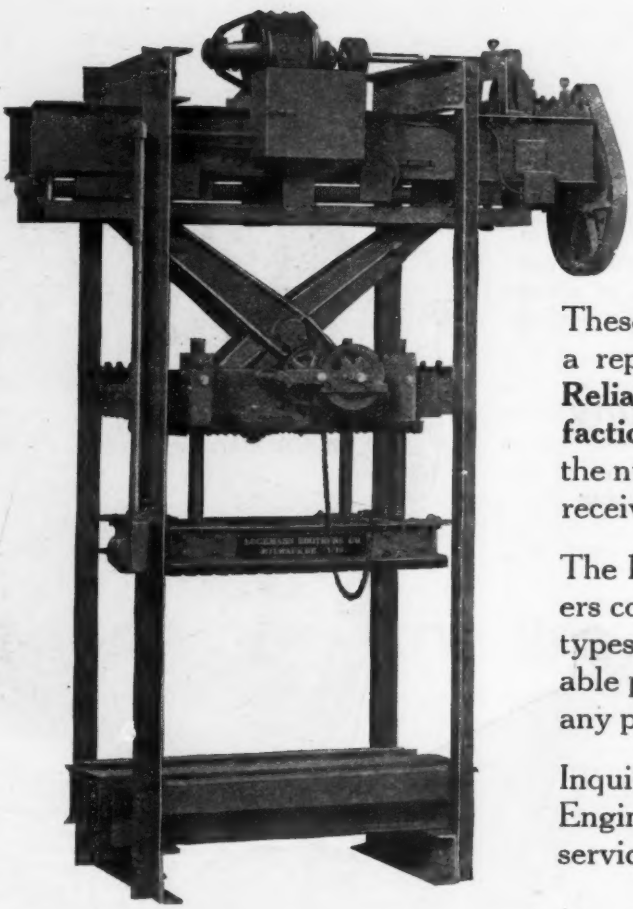
ANDERSON MOTOR COMPANY

ROCK HILL, SOUTH CAROLINA

LOGEMANN

Hand-Belt-Electric-Hydraulic

Baling —— Presses



USED FOR MANY YEARS IN HUNDREDS OF TEXTILE MILLS THROUGHOUT THE COUNTRY

These balers have established a reputation for **economy, Reliability** and **General Satisfaction** that is best indicated by the numerous repeat orders we receive continually.

The LOGEMANN line of balers consist of more than eighty types and capacities and a suitable press can be furnished for any purpose.

Inquiries are solicited and our Engineering Staff is at your service.

LOGEMANN BROTHERS CO.

Main Office & Works - Milwaukee, Wis.

3102 Burleigh Street

If It's A Broadside—

If it is an especially large illustration for an especially large piece of literature, chart, birds eye view, map, etc. Whether it be in one or more colors, our plant is equipped to supply your needs. No halftone or line plate too large or too small for our equipment.

Illustrating Your Literature

Sometimes in the preparation of your sales and advertising plans you find the need of some especially prepared piece of literature, the execution of which will baffle your photographer, electrotyper and printer. Frequently you may seek a service that the ordinary plant cannot give.

Our plant is designed and equipped for the accomplishment of many difficult products that cannot be secured from most photo-engraving establishments; is equipped to furnish the best of photo-engraving, electrotyping, printing, nickeltyping, commercial art and allied service, whether large or small, whether one or more colors. The extent of our equipment is reflected in the large process camera, which can furnish you with process color plates as large as a yard square. One of the 6 largest in the world. If you have an idea you wish carried into execution, we are at your service. We will gladly perfect it and illustrate it.

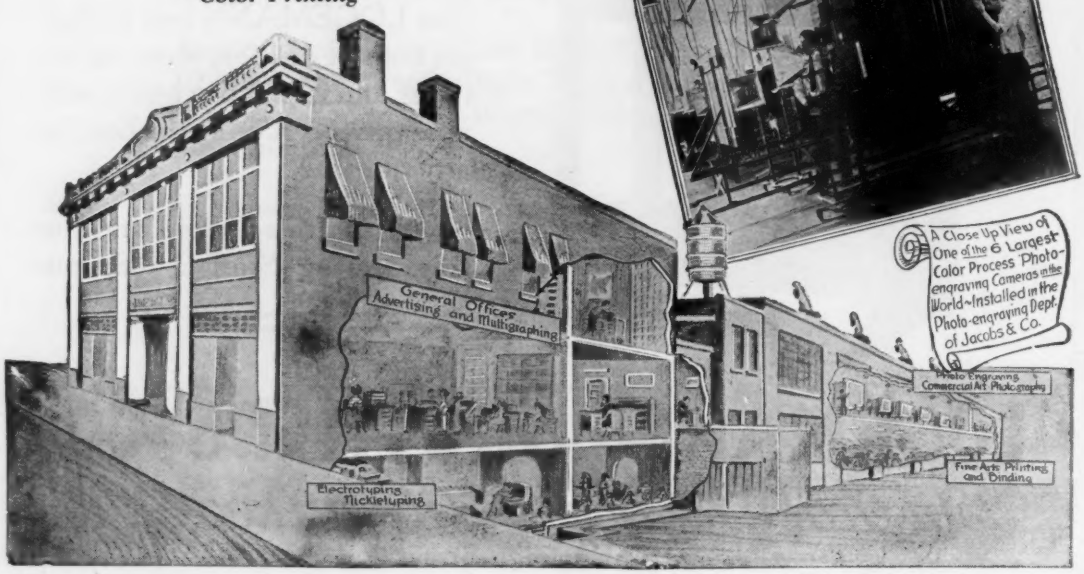
Battery of Cameras in the Photo-Engraving Department

A Close Up View of One of the 6 Largest Color Process Photo-engraving Cameras in the World—Installed in the Photo-engraving Dept. of Jacobs & Co.

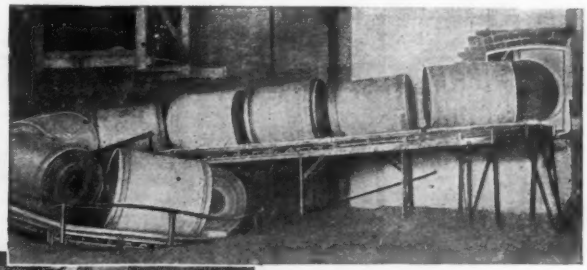
Jacobs & Company

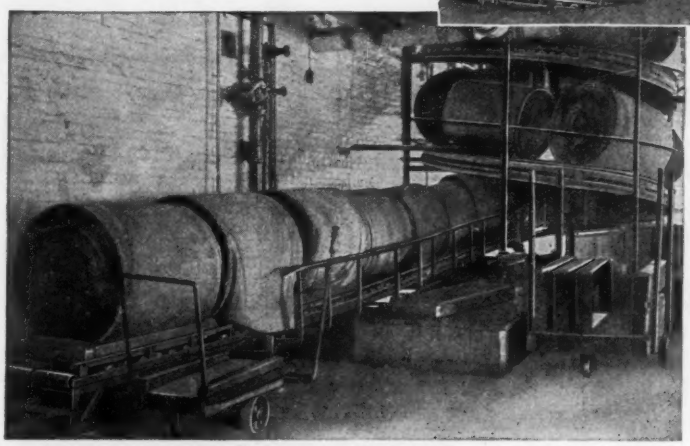
Clinton, S. C.

Advertising, Commercial Art
Photo-Engraving—Electrotyping
Nickeltyping
Color Printing


General Offices Advertising and Multigraphing
Photo Engraving Commercial Art Photography
Fine Arts Printing and Binding
Electrotyping Nickeltyping

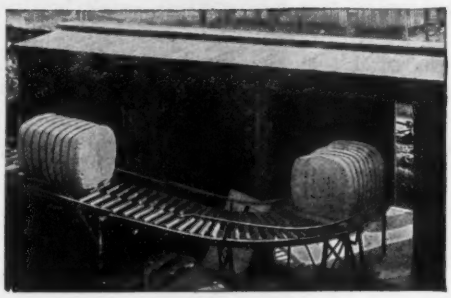
DO IT WITH GRAVITY





At the Arnold Print Works.

Link Your Departments Together Without Labor or Power



At the Cherry Cotton Mills.

THE labor or power you are now using in carrying, wheeling or trucking materials to or from cars and from one department to the other, CAN BE SAVED. "Do it with power" is well meant, but power costs money. Now, they "Do it with gravity" and save BOTH labor and power. There's a big supply of latent energy, called gravity, waiting to be harnessed and put to work in your mill. Why not use it—it costs nothing?

MATHEWS GRAVITY ROLLER CONVEYER

Put the Mathews Gravity Roller Conveyer to work. Let it unload or load the cars or carry your cotton or cotton goods, bales, cases, bags, piece goods or other products from one department to the other, without the use of labor or power—with no waiting for materials, no confusion, no time lost.

The Mathews has proved itself in many mills—it is no experiment. Its steel, ball-bearing rollers respond even in the most gentle inclines or long stretches of trackage.

Regardless of the conditions in your mill, a Mathews Conveyer can be adapted to it and assures you a saving of from 50 to 70% in time and labor. It can be fitted either sectionally or permanently.

Our representative in your locality will gladly call on you and plan a Mathews System best suited to your conditions. Why not find out the advantages and savings which can be assured you with a Mathews system—it won't cost you anything and you will be under no obligation. Write us today for full information.

Mathews Automatic Elevators eliminate the necessity for large freight elevators or operators. It will automatically receive from or discharge to any number of floors. Relieves congestion,—keeps goods moving.

MATHEWS GRAVITY CARRIER CO.

162 TENTH ST., ELLWOOD CITY, PA.

Sales Engineers in All Important Cities.

Other Mathews products include Inclined Elevators, Spiral Chutes, Straight Chutes, Apron Conveyors, Belt Conveyors and roller specialties of various kinds.

Promoting Cooperation and Fair Competion

A B P Standard No. 8

"To COOPERATE with all organizations and individuals engaged in creative advertising work."

THE distance between buyer and seller must be shortened; the roadway which leads from producer to the final consumer must be made straight, broad and smooth; the cost of distribution must be reduced—that is why we pledge ourselves to cooperate with all others engaged in creative advertising work.

We believe that advertising is an economic force, a piece of improved sales machinery, which properly employed, becomes a boon to business and society.

So we ARE cooperating in every movement that will put advertising on a higher plane and make it more efficient. Recently we conducted in the larger cities a 6-months course in Publishing and Advertising which was attended by over 1000 employees of our various papers, and for which the students paid over $60,000.00.

As an organization we are active members of the Associated Advertising Clubs of the World, Chamber of Commerce of U. S. A., and of the Audit Bureau of Circulations. Our members are solidly behind every movement for better merchandising and better selling

A B P Standard No. 9

"To avoid unfair competition."

FAIR-PLAY is ingrained in the American character, and it is one of the practical working standards of The A B P, Inc. It is enforced too—if someone's foot slips a little, he is brought back into line with kindly but insistent firmness.

Concretely, our idea of fair competition is to see who can build the most, not who can tear down the most, but this involves no easy tolerance of evil practices whether in publishing or the fields we serve.

If you have read the preceding adver tisements in this series, you will begin to understand that the A B P papers are of superior merit, because they are built upon the solid rock of right principles.

THE ASSOCIATED BUSINESS PAPERS, Inc.

JESSE H. NEAL, Executive Secretary

HEADQUARTERS: 220 WEST 42nd STREET NEW YORK CITY

Cotton is a Member of the A. B. P.

The Wood Box

1. Reduces Shipping Costs
2. Creates Customer Good-Will
3. The Best Damage Protection Insurance

MANUFACTURERS of textile products, as well as all other manufacturers of today, realize the valuable asset in the good-will of their customers and that any part of their service that is causing dissatisfaction to the customer means a tangible loss in dollars and cents.

The question of shipping containers is one of importance to the textile manufacturer—it is a question of getting your product to the customer in the best possible condition thereby gaining good will for the product and yourself—and it is also a question of saving yourself losses from damage to shipments.

It is significant to note that industry in general is selecting shipping containers that afford the greatest damage protection and are demanding WOOD BOXES. But some shippers are using boxes that are too light, which makes the box liable to break open—others use boxes too heavy which unnecessarily increase freight charges.

Are your goods getting maximum protection at minimum cost? Is your packing expense too great?

HIGHTOWER Wooden Packing Cases have been found the most all-round satisfactory and economical shipping containers possible. The interlocking reinforcement feature makes it possible to use lighter-weight material and the case will carry heavier materials and is harder to pilfer, or break open than others.

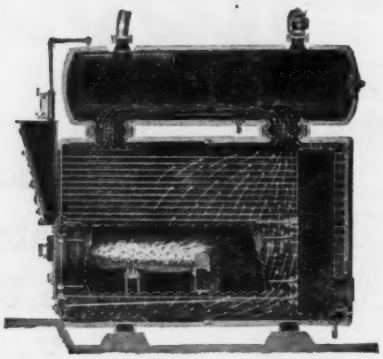
Give us the details of your shipments and we will tell you the most economical and satisfactory way of shipping your products.

Hightower Box & Tank Company

ATLANTA, GA. BIRMINGHAM, ALA.

HIGHTOWER
Wooden Packing Cases

More Dry Steam With Less Fuel



HERE'S a perfect Scotch Boiler—a boiler that will generate more steam with less fuel.

Rapid, unrestricted circulation is absolutely necessary to the efficiency of any boiler, and while this feature is claimed for by many boiler manufacturers, the design of this boiler is such that it is positive at all times.

Large overload capacity, dry steam generated, and the remarkable flexibility of meeting fluctuating demands particularly adapts this boiler to severe conditions in industrial mills and plants.

Greatest economy is assured because of the circulating passage, which delivers water from the front neck to the bottom of the shell.

A constant temperature is assured because of this circulation which relieves uneven strains and stresses on this type of boilers.

There are no troublesome brick settings, as the boiler is self-contained and is ready for operation upon delivery.

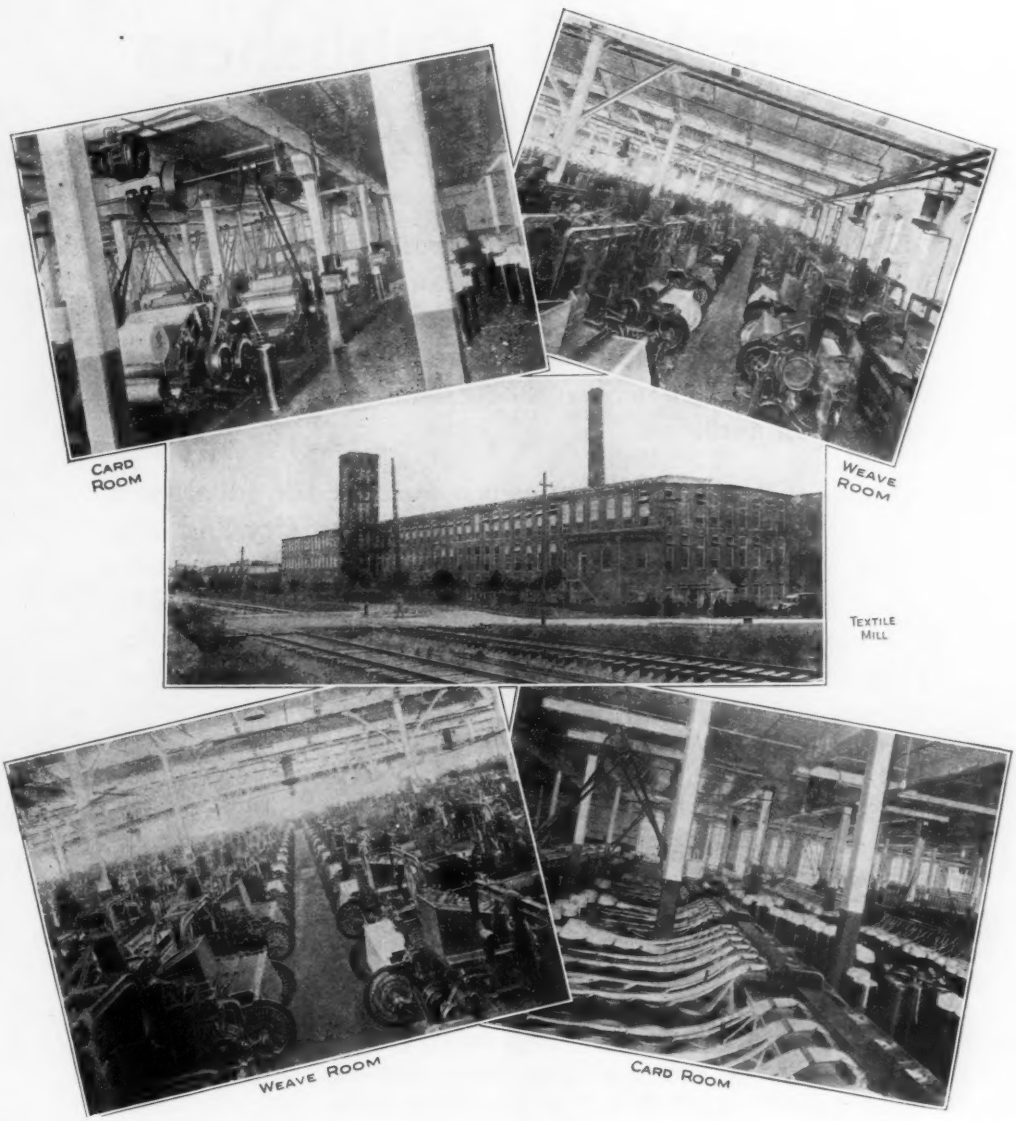
Write today for detail information.

INTERNATIONAL ENGINEERING WORKS, Inc.
FRAMINGHAM, MASS.

Southern Representative, Isaac Hardeman, Charlotte, N. C.

BOSTON **NEW YORK**
PHILADELPHIA **SAN FRANCISCO**

Complete Electrical Equipment For Textile Mills



Allis-Chalmers equipment for textile mills includes power equipments of every type as well as auxiliary electrical apparatus, a full line of textile motors for group or individual drive, centrifugal pumps, air compressors, transmission machinery, etc.

Send for new Bulletin "Power Equipment for Textile Mills"

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery

ALLIS-CHALMERS MANUFACTURING COMPANY

MILWAUKEE, WISCONSIN. U.S.A.

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

Over 1400 Publishers Belong to the A. B. C.

COTTON is one of the many progressive publications, members of the Audit Bureau of Circulations, that have adopted an open and "Above Board Circulation" policy. A. B. C. reports lay before advertisers vital circulation facts that have been checked and verified by trained circulation auditors.

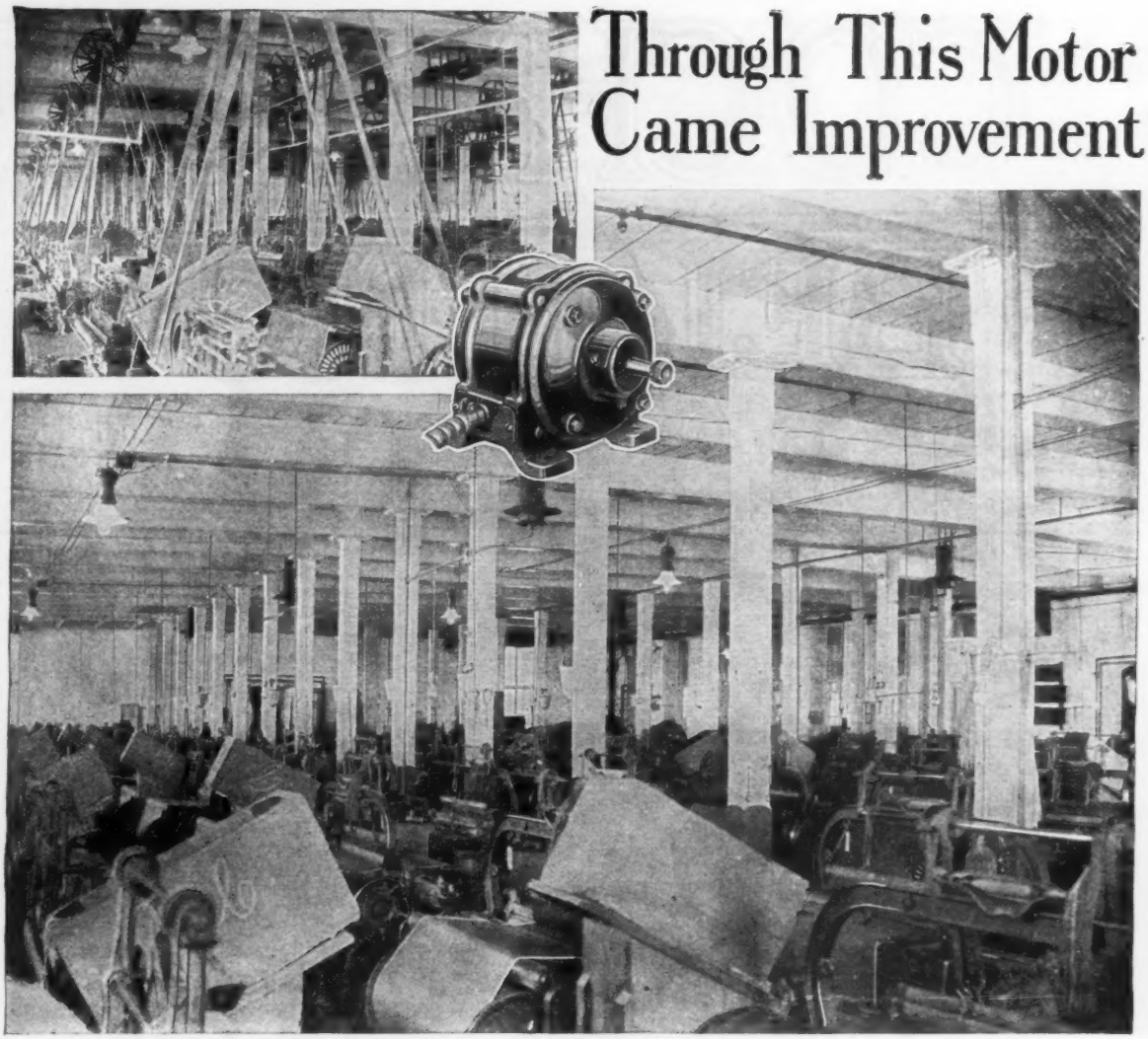
Among A. B. C. publications it is possible for advertisers to compare detailed circulation data as to city and suburban circulation, trading territory, contests, premiums, and other points of interest to advertisers. Only under this plan can they buy space with a full knowledge of the Pertinent Facts. They can have confidence in the effectiveness of their Campaigns.

Before the advent of the A. B. C., advertisers were forced to depend upon hearsay information and "Sworn Statements" of circulation. Detailed figures were not available. Today buyers of space look to the A. B. C. for solid unbiased circulation information and select their advertising mediums accordingly.

You can secure such facts on COTTON by referring to the latest A. B. C. Report. A copy will be gladly furnished on request.

(WRITE TO THE AUDIT BUREAU OF CIRCULATIONS, 202 SOUTH STATE STREET, CHICAGO, FOR A COPY OF "THE MEASURE OF YOUR MESSAGE")

Through This Motor Came Improvement



Thirty Years of Progressive Service to the Textile Industry

Thirty years ago, the General Electric Company furnished induction motors for the first textile mill to adopt electric drive. Today, over 75% of all the electric power used in the textile industry in this country is applied through G-E Motors —in group and individual drives.

The broad, successful application of motors to textile machinery is a part of the General Electric Company's complete service in building all apparatus and supplies used in the generation, transmission, distribution, and application of electricity in textile mills.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

44-46

COCHECO BELTING

The Ultimate in Power Transmission

WE do not believe that belt users are particularly interested in methods of belt manufacture; what they do want to know, is whether the belt they purchase will deliver the ultimate in power transmission.

That Cocheco Leather Belting will do this, and do it for an unusually long period, is evidenced by a recent call made upon us to repair one of these belts that had been in use for 29 years.

We solicit your confidence and business on the basis of belt quality which is unexcelled and the reputation for integrity and trustworthiness our concern has enjoyed since its foundation in 1842.

Catalog?

I. B. WILLIAMS & SONS

Dover, New Hampshire

BOSTON, MASS., 157 Summer St. NEW YORK, N. Y., 71-73 Murray St.
CHICAGO, ILL., 14-16 N. Franklin St.

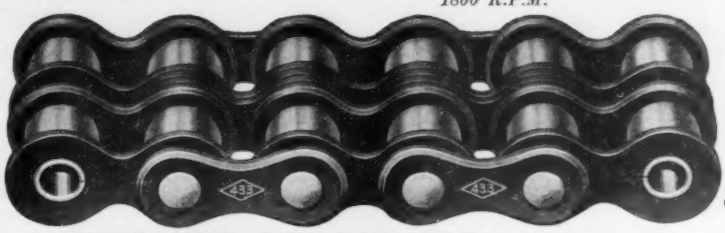
ROLLER CHAIN NO. 82. Pitch ⅜"; width $\frac{5}{16}$".

No. 82 will transmit 2 H.P. at 1800 to 3500 R.P.M.

ROLLER CHAIN NO. 66. Pitch ½"; width $\frac{5}{16}$". Single, will transmit 3 H.P. at 1200 to 1800 R.P.M. Double, will transmit 5 H.P. at 1200 to 1800 R.P.M.

ROLLER CHAIN NO. 149. Pitch ⅝"; width ¼" or ⅜". Single, will transmit 5 H.P. at 1200 to 1800 R.P.M. Double, will transmit 10 H.P. at 1200 to 1800 R.P.M.

All of these chain models will operate at speeds up to 1300 feet per minute.



Double roller chains will transmit a given amount of power at higher speeds than single chains.

DOUBLE ROLLER CHAIN NO. 433. Pitch ¾"; width $\frac{5}{16}$" or ½". Single, will transmit 7½ H.P. at 900 to 1200 R.P.M. Double, will transmit 15 H.P. at 900 to 1200 R.P.M.

DIAMOND High Speed Roller Chains

for motor drives and all kinds of textile machinery

FOR years, DIAMOND high speed roller chains have served as drives from electric motors and for general machinery drives in practically every important industry in America. They have demonstrated conclusively that roller chains are well adapted to high speeds and heavy loads and will operate successfully under severe conditions.

DIAMOND Roller Chains are being used more and more in the textile industry. They provide a positive, durable and very economical drive that is especially well adapted to drives from motors to spinners, fly frames, carding machines, roving frames, etc., and to a wide range of other power transmission purposes on textile machinery.

These chains offer great economies over belt drives, in eliminating slippage, saving power, increasing efficiency, reducing upkeep cost and doing away with frequent shut-downs for belt adjustments.

The wide experience of our engineering department is offered you for the solution of any of your power transmission problems, without obligating you in any way. Take advantage of this service before you decide on the type of transmission for any new machinery. Send us your specifications and we will gladly submit recommendations and estimates.

Every mill operator, superintendent and engineer should have our catalog on file; also our Data Sheets on Roller Chain Drives. Mail the coupon and we will send you copies.

DIAMOND
Roller Chains

Diamond Chain & Mfg. Co.
Indianapolis, Ind., U. S. A. c-1

Gentlemen:

Mail me your Catalog and Data Sheets on Roller Chain Drives.

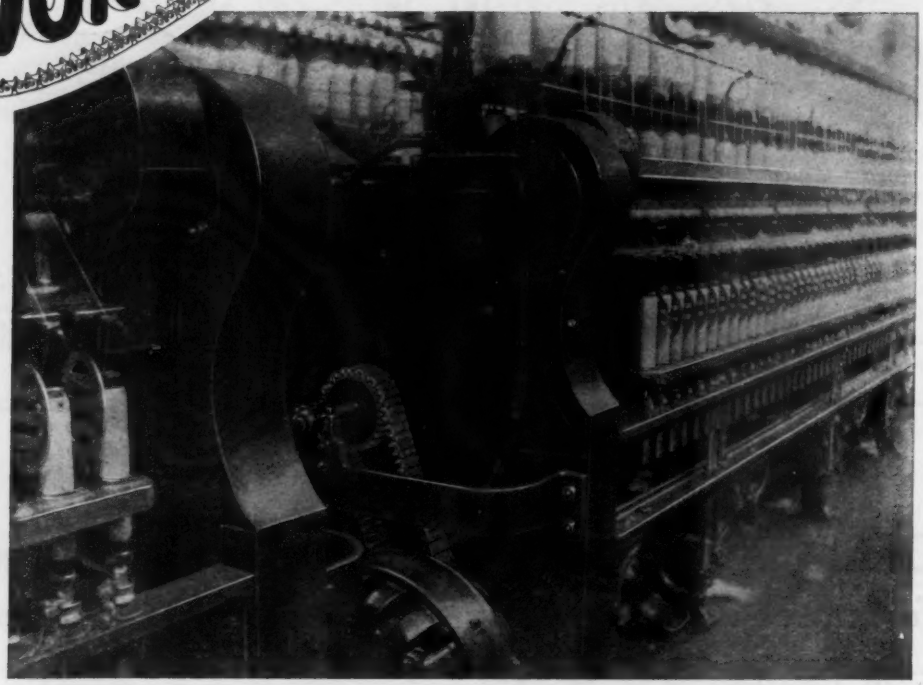
Name _____

Position _____

Firm _____

Address _____

MORSE SILENT CHAIN DRIVES



5 H. P. Morse Chain driving spinning frames. Driver 1120 R. P. M., Driver 815 R. P. M. Center Distance 18 3-8 inches.

Getting most power from the driving unit

The successful installation is one that utilizes the power developed with maximum efficiency. This usually depends on how the developed power is transmitted.

Morse Silent Chain Drives transmit 98.6% of the power developed with positive fixed speed ratios, uniform smoothness of operation, and a minimum of upkeep. They require little attention, possess great durability, and flexibility of speed.

When continuity of operation is essential, Morse Drives are used with the utmost satisfaction. From the standpoint of power transmitted, endurance, and all-around dependability, they are aids to economical production.

The installation of Morse Silent Chains results in an increase in production—there is no lost motion—no slipping—no breaking—just day in and day out ever-reliable service.

Permit our engineers to show you how Morse Drives utilize with maximum efficiency, the power developed by the driving units.

MORSE CHAIN CO., ITHACA, N. Y.

There is a Morse Engineer near you

ATLANTA, GA...702 Candler Bldg., Earl F. Scott & Co.
BALTIMORE, MD.....1402 Lexington Bldg.
BOSTIN, MASS.....141 Milk Street
CHARLOTTE, N. C.....404 Commercial Bank Bldg.
CHICAGO, ILL.....Room 803, 112 West Adams St.
CLEVELAND, OHIO.....421 Engineers Bldg.
DENVER, COLO.....1761 Wazee St., R. M. Parsons
DETROIT, MICH.....7601 Central Avenue
KANSAS CITY, MO.....Finance Bldg., Morse Eng. Co.
NEW YORK CITY.....Room 1871, 50 Church St.
MINNEAPOLIS, MINN. 413 Third Street, S., Strong-Scott Mfg. Co.
MONTREAL, QUE., CAN. St. Nicholas Bldg., Jones & Glassco, Reg'd
PHILADELPHIA, PA.....812 Franklin Trust Bldg.
PITTSBURGH, PA.....Westinghouse Bldg.
SAN FRANCISCO, CAL.....Monadnock Bldg.
ST. LOUIS, MO.....Chemical Bldg., Morse Eng. Co.
TORONTO, ONT., CAN. Bank of Hamilton Bldg., Jones & Glassco, Reg'd
WINNIPEG, MAN., CAN. Dufferin Street, Strong-Scott Mfg. Co.

2085-30

Strom BALL BEARINGS

What this trade-mark on a Ball Bearing means to you—

A STROM trade-mark on a ball bearing means that

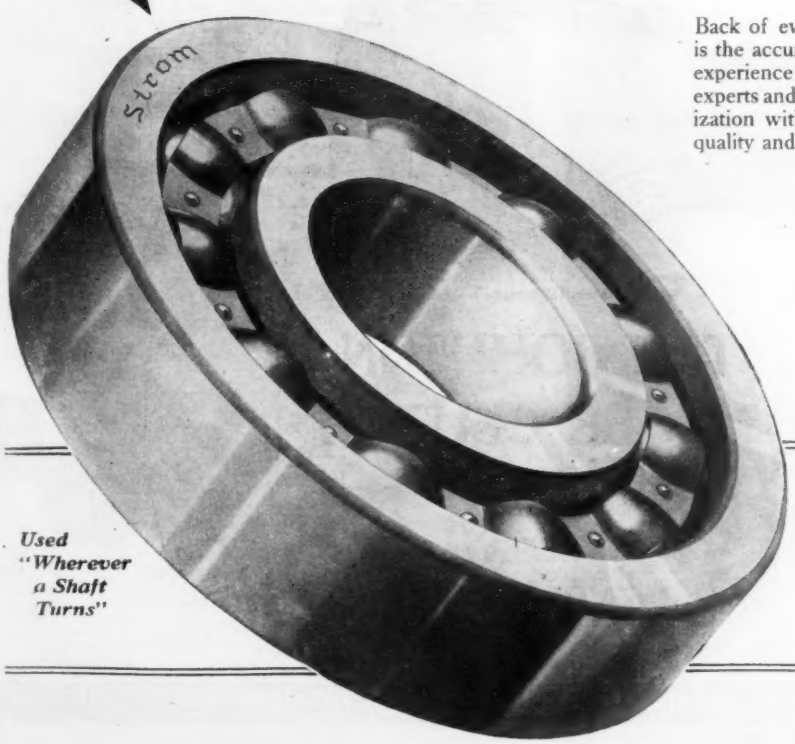
—You are getting a bearing which is the first choice of leading engineers in all industries.

—You are getting a bearing which is correctly designed to carry the load and reduce friction to a minimum.

—You are getting a bearing made of special ball bearing steel, heat-treated by the most modern and approved methods (not merely case-hardened).

—You are getting a bearing which is made by skilled workmen in a modern plant and rigidly inspected in every step of its manufacture.

—You have at your disposal—always—all the resources of this great institution devoted solely to manufacturing high-grade ball bearings.



Back of every Strom ball bearing is the accumulated knowledge and experience of a staff of engineering experts and a manufacturing organization with the highest ideals of quality and service.

We offer

—Expert engineering assistance.

—A wide variety of types of ball bearings for all purposes.

—Prompt delivery from stock on standard sizes.

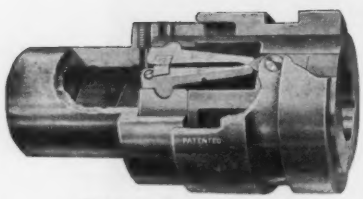
—Our catalog No. 8, giving dimensions and load carrying capacities of Strom ball bearings, as well as other ball bearing literature.

Used "Wherever a Shaft Turns"

U. S. Ball Bearing Mfg. Co.
4544 Palmer St., Chicago, Ill.

THE JOHNSON FRICTION CLUTCH

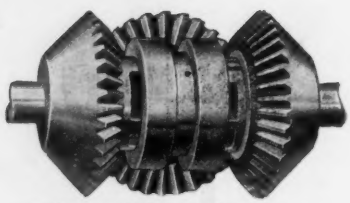
Cut the Cost of Power Transmission



Single Clutch—Sectioned

by using

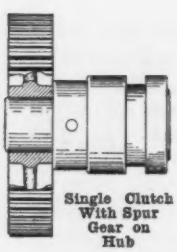
JOHNSON CLUTCHES



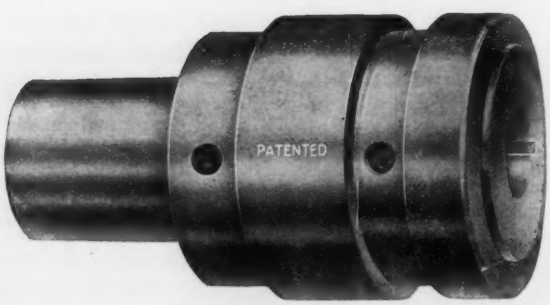
Double Clutch Between Bevel Gears.

as illustrated

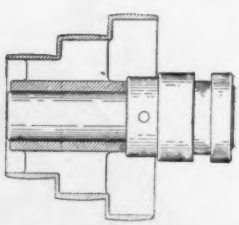
"Be Sure It's a Johnson"



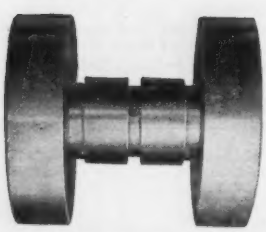
Single Clutch With Spur Gear on Hub



Single Clutch, Exterior



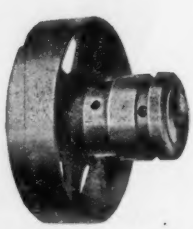
Single Clutch with Cone Pulley on Hub



Double Clutch with Pulleys

THE JOHNSON SINGLE CLUTCH

WRITE FOR CATALOG "G"



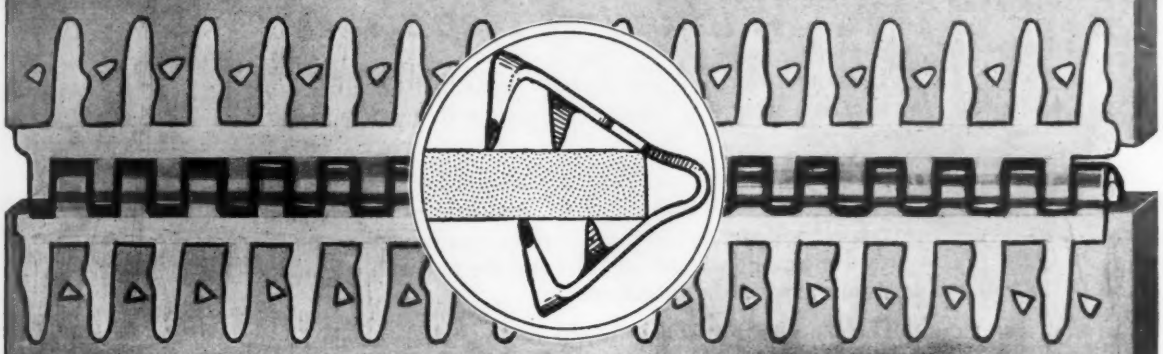
Single Clutch with Pulley

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

ALLIGATOR

TRADE MARK REG. U. S. PAT. OFFICE

STEEL BELT LACING



HOW LACING CAN LENGTHEN THE SERVICE OF YOUR BELTS

The extra strength of ALLIGATOR STEEL BELT LACING means longer uninterrupted service. The teeth clinch through the belt end, compressing it in a grip of steel. It gives the weakest spot in the belt the greatest protection. The joint is flexible and separable. It is smooth on both sides and no thicker than the belt. Any good workman can make a long-lasting, efficient joint quickly and easily.

STANDARDIZE YOUR LACING

Save extra time spent in lacing and replacing belts. Help them to give the maximum service which the manufacturers intended. Standardize your plant on ALLIGATOR STEEL BELT LACING for light and heavy duty drives.

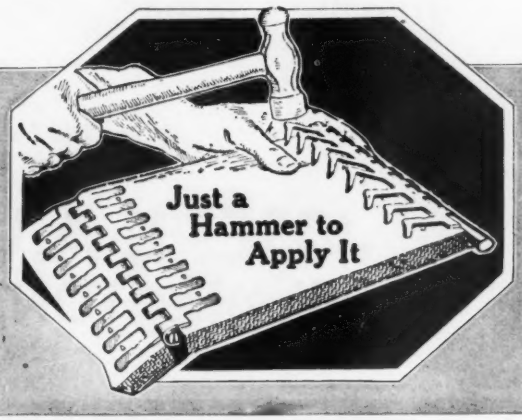
Recommended by leading manufacturers of belting and by transmission engineers.

FLEXIBLE STEEL LACING CO.

4619 LEXINGTON ST. CHICAGO

Sold at wholesale and retail the world over.
In England at 135 Finsbury Pavement, London, E. C. 2.

"Every Tooth A Vise"



For Every Size and Kind of Belt

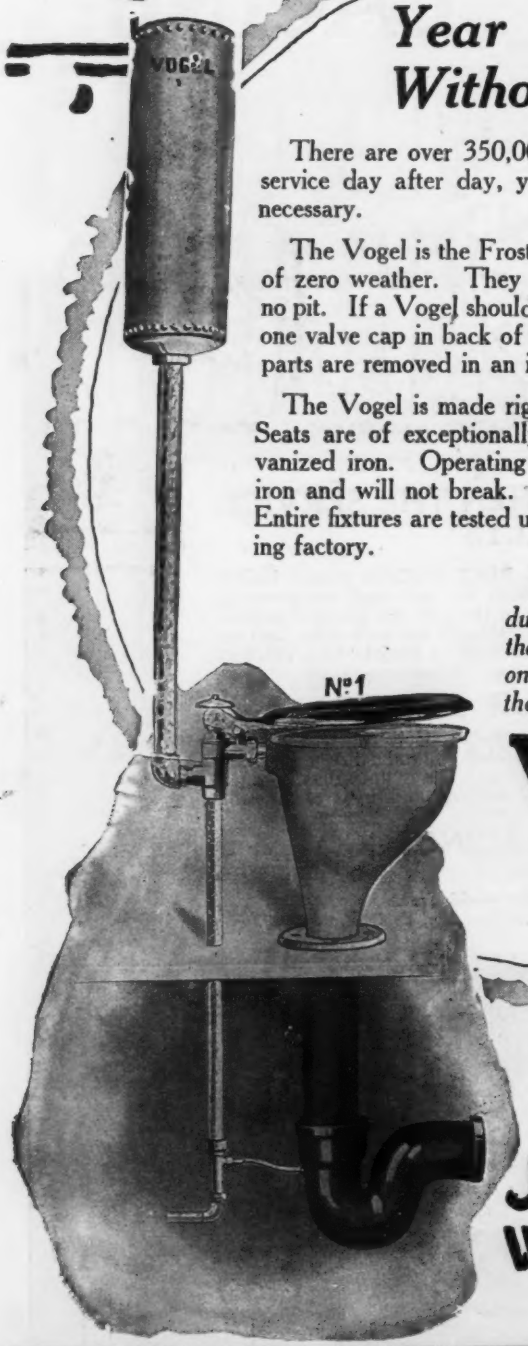
Vogel Closets
Most Durable Made

Year After Year Without A Repair

There are over 350,000 Vogel Closets that have been in service day after day, year after year, with never a repair necessary.

The Vogel is the Frost Proof Closet that has stood the test of zero weather. They are easily installed for they require no pit. If a Vogel should ever require a repair, merely remove one valve cap in back of the bowl and the rod with operating parts are removed in an instant.

The Vogel is made right of the best materials obtainable. Seats are of exceptionally strong hardwood. Tank is galvanized iron. Operating levers are of galvanized malleable iron and will not break. Valve bodies are of quality brass. Entire fixtures are tested under hydraulic pressure before leaving factory.



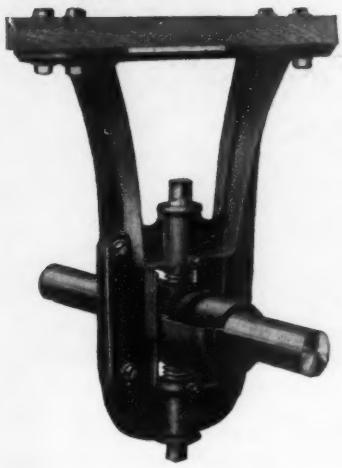
If you want the simplest, most durable, frost-proof closet and one that costs no more than ordinary ones, always specify and insist on the

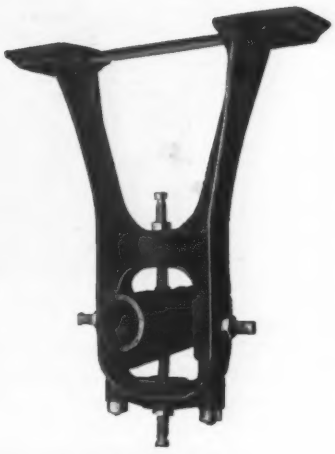
VOGEL PATENTED

Sold by Wholesalers of Plumbing Goods everywhere.

JOSEPH A. VOGEL CO.
WILMINGTON, DELAWARE

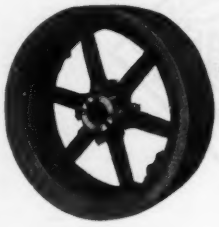
DODGE





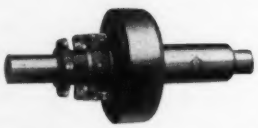
Visit our exhibit at International Textile Exposition, Boston, Mass., Oct. 29th to Nov. 3.

DODGE Means Power Savings



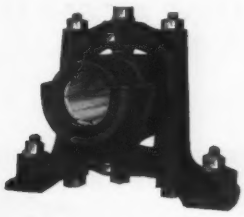
Your power roadbed is an important factor in determining your power costs. Dodge transmitting machinery insures balanced power; balanced power means less friction; less friction means lower costs and increased profits.

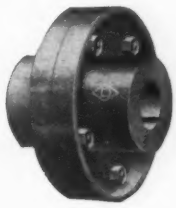
Dodge makes everything for the mechanical transmitting of power. Stock units can be purchased from your local dealer on the immediate delivery basis.



Dodge Manufacturing Corporation

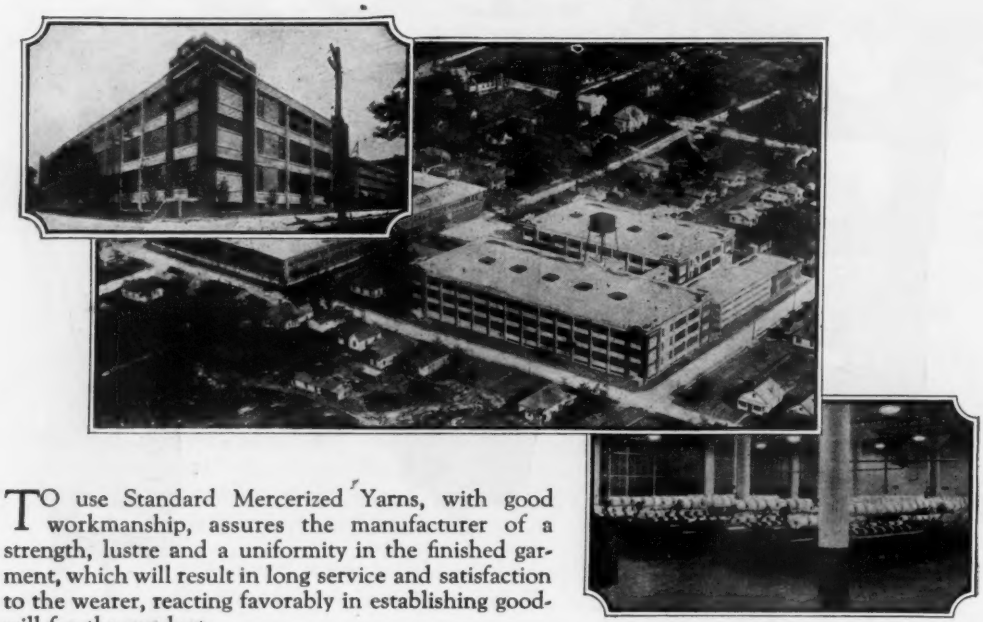
General Office: Mishawaka, Indiana. Works: Mishawaka, Indiana, and Oneida, N. Y.
New York Philadelphia Pittsburgh Boston Cincinnati Newark Chicago
Atlanta Minneapolis St. Louis Houston Seattle San Francisco





Standard-Coosa-Thatcher Co.

Chattanooga, Tennessee



TO use Standard Mercerized Yarns, with good workmanship, assures the manufacturer of a strength, lustre and a uniformity in the finished garment, which will result in long service and satisfaction to the wearer, reacting favorably in establishing goodwill for the product.

Standard-Coosa-Thatcher Co., makers of the Standard Mercerized Yarns, retained our services in 1916 to plan, design and supervise the construction and equipment of their reinforced concrete textile mill building at Chattanooga, Tenn. Four years later, we were again retained for the same service in the construction and equipment of a still larger mill at Chattanooga and another mill at Piedmont, Ala.

We feel it is significant that 85 per cent. of our business comes from clients who have previously employed our service.

Sirrine Service is the result of an experience of nearly a quarter century in planning, designing and supervising the development and expansion of hundreds of textile plants.

Arrange for a conference with a member of this organization, or write us about your problem. This involves no obligation.

Meanwhile, write for a copy of a new and revised edition of "Picks to the Minute"—a short treatise on textile plants, their design and operation.

J. E. SIRRINE & COMPANY

Engineers

Greenville South Carolina

SERVICE

5 virtues

ANTI-rutting, ANTI-crumbling, ANTI-absorbent, dustless and acid-proof—vitrified brick is the one paving material with the 5 virtues demanded by factory truck-runways, loading and unloading platforms and certain departments where wear or impact is severe or grease and oil render other surfaces slippery and dangerous.

The slightly greater "underfoot cost" on installation saves materially in "overhead cost" later because repair costs are so nearly negligible.

Specifications for any specific use gladly submitted.

NATIONAL PAVING BRICK
MANUFACTURERS ASSOCIATION
ENGINEERS BLDG. CLEVELAND, OHIO

FOR INDUSTRIAL PAVEMENTS

Vitrified Paving

Brick

SMOOTH—SAFE—ENDURING

Albion Shale Brick Company
Albion, Ill.
Alton Brick Company
Alton, Ill.
Barr Clay Company
Streator, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinwood Shale Brick Company
Cleveland, Ohio
Corry Brick & Tile Company
Corry, Pa.
Francis Vitric Brick Company
Boynton, Okla.
Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio
Hammond Fire Brick Company
Fairmont, W. Va.
Hocking Valley Brick Company
Columbus, Ohio
Independence Paving Brick Co.
Independence, Kans.
Mack Mfg. Company
Wheeling, W. Va.
C. P. Mayer Brick Company
Bridgeville, Pa.
Medal Paving Brick Company
Cleveland, Ohio
Metropolis Paving Brick Co.
Pittsburg, Kans.
Metropolitan Paving Brick Co.
Canton, Ohio
Mineral Wells Paving Brick Co.
Mineral Wells, Texas
Moberly Paving Brick Company
Moberly, Mo.
Murphysboro Paving Brick Co.
Murphysboro, Ill.
Patton Clay Mfg. Company
Patton, Pa.
Peebles Paving Brick Company
Portsmouth, Ohio
Pittsburg Paving Brick Company
Pittsburg, Kansas
Purington Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.
Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Company
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
Toronto, Ohio
Trinidad Brick & Tile Company
Trinidad, Colo.
Veedersburg Paver Company
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Western Shale Products Company
Fort Scott, Kans.
Westport Paving Brick Company
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SERVICE AND PRICE

FOR YOUR CONSIDERATION

Consult Us Before Purchasing

T. L. Talbert Iron & Steel Co., Inc.

PLANT & OFFICE
407 S. CHURCH ST. **Charlotte, N. C.**

Manufacturers ***Fabricators*** ***District Representatives***

NOT ONLY DO WE CARRY STOCKS OF

STRUCTURAL STEEL
CAST IRON
STEEL SASH

REINFORCING SHEET STEEL METAL LATH
BAR IRON BOILER TUBES STEEL CABINETS
BOLTS PIPE FLOOR SURFACING MACHINES

OR MANUFACTURE,
FIRE ESCAPES
CHISELS
DRILLS

ORNAMENTAL WORK OF ANY NATURE
RAILINGS KNOCK OFF LEVERS FORGINGS
STAIRS PIPE CLAMPS GRATINGS
HAND BEATEN FIREPLACE FIXTURES

OR FABRICATE,
TRUSSES
LADDERS
STEEL STRUCTURES

STRUCTURAL WORK OF ANY NATURE
MOTOR SUPPORTS TANKS TANK BANDS
WINDOW GUARDS STEEL DOORS
PIPE RAILING
TABLES TRANSMISSION TOWERS

BUT WE ARE BACKED BY THE LARGEST CONCERNS OF ITS NATURE IN THE UNITED STATES REPRESENTED BY US IN THIS TERRITORY

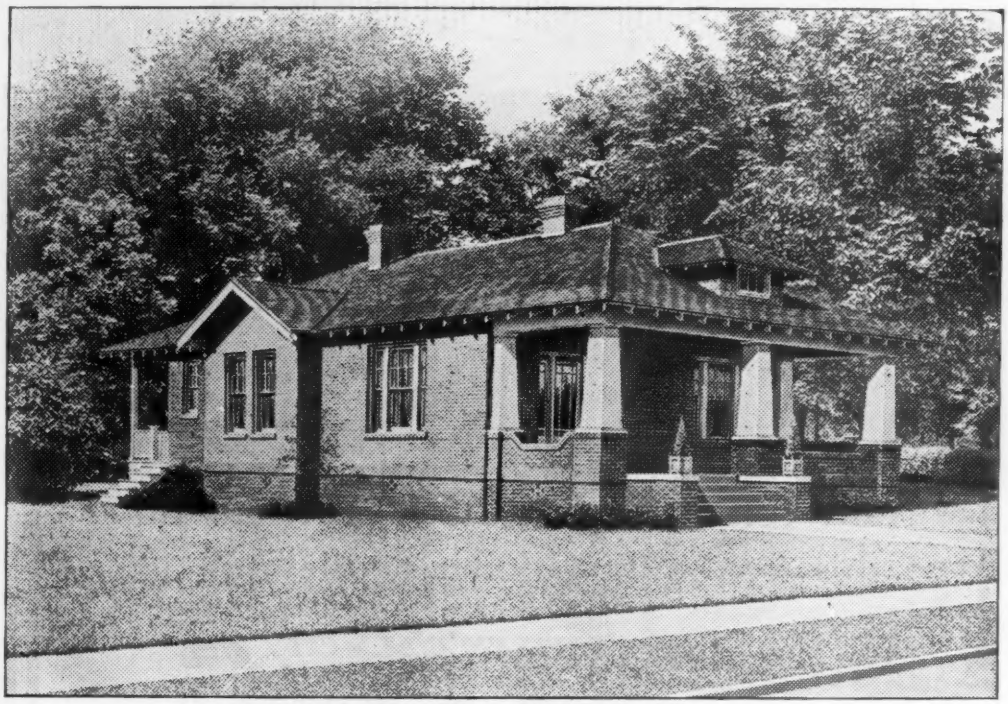
TRUSCON STEEL CO.
YOUNGSTOWN, OHIO
STEEL SASH BARS BUILDINGS
STEEL JOISTS METAL LATH

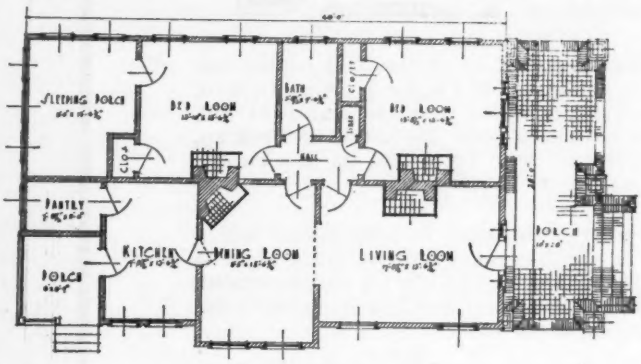
AMERICAN ABRASIVE METALS CO.
NEW YORK, N. Y.
ABRASIVE METALS STAIR TREADS
THRESHOLDS DOOR SADDLES FLOOR PLATES

AMERICAN 3-WAY LUXFER PRISM CO.
CHICAGO • NEW YORK
STEELEAD SKYLIGHTS SIDEWALK DOORS
REINFORCED CONCRETE VAULT, FLOOR & ROOF LIGHTS

LET US MAIL YOU DESCRIPTIVE CIRCULARS COVERING THE ABOVE

We Handle Every Building Detail





FLOOR PLAN
of the Minter Home Illustrated Above

Type of Minter Home selected for Superintendent's Residence by a leading Textile Firm. Exterior finish of this attractive home may be either brick veneer, as shown, or in wood.

You are delivered completed homes when you place your housing in our hands. Only one contract is necessary.

No matter what your building needs may be—one and two-story community houses, churches, stores, school houses, moving picture theatres, apartment houses or other structures—you can have them erected in exact accordance with your plans or those of your architect without being troubled by any detail.

All Minter structures are built of the best materials of the kind specified, are erected in minimum time and without loss of time, labor or materials.

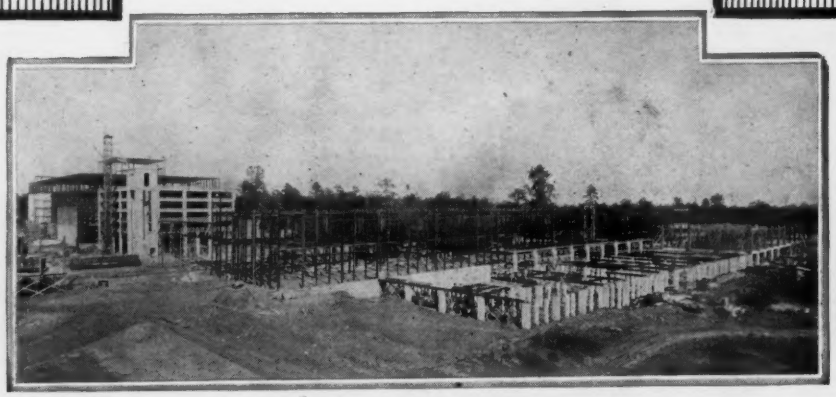
The Minter System is the modern method of building that saves your time, your nerves and the money of you and your stockholders.

Write us today about the houses you need.

THE MINTER HOMES CO.
GREENVILLE, SOUTH CAROLINA

MINTER HOMES CORPORATION
HUNTINGTON, WEST VIRGINIA

For better concrete—SLAG



All coarse aggregate for concrete in this five million dollar textile mill is

"ENSLEY" & "ALA CITY"
BASIC SLAG
CRUSHED & SCREENED

Photo shows progress as of Nov. 1st on the immense textile buildings of Pacific Mills at Lyman, S. C. Five million dollar concrete and steel job, construction of which is in the hands of Parklap, Inc., contractors of New York, and the Lockwood, Greene & Co., engineers (Boston).

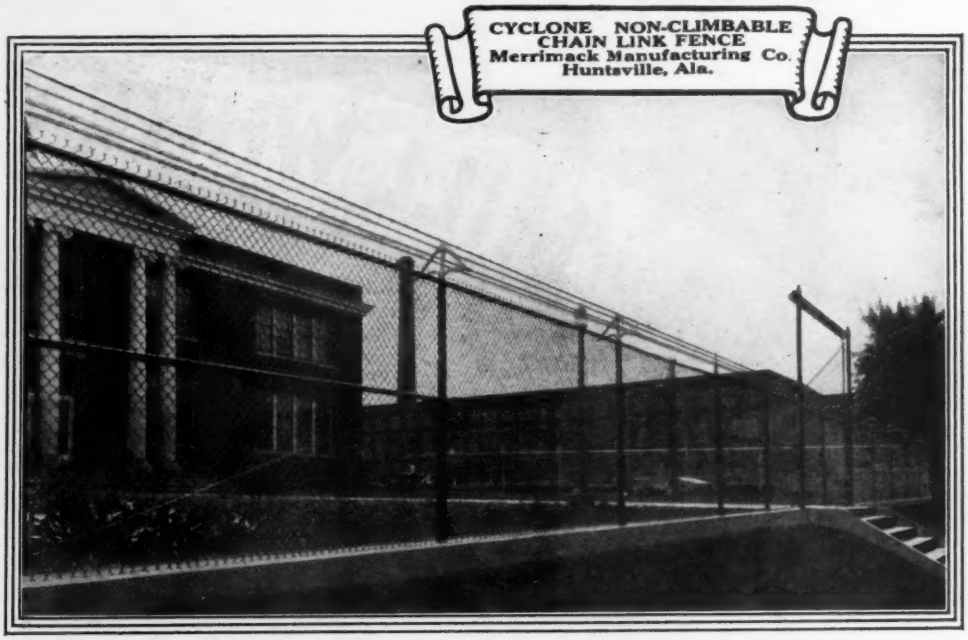
The larger building in background which will be the bleachery and finishing plant is 635 ft. by 196 ft., two stories and basement. Immediately behind this is a five-story reinforced concrete storehouse.

Slag Concrete is practically Everlasting!

The far building will be 4 stories (135 ft. by 290 ft.) and will house 32,000 spindles producing wide sheeting. To serve these operations a 2,500,000 gallon per day filter plant is being erected on the Middle Tiger River.

In all of these units, "Alabama City Basic Slag" is being used exclusively as the coarse aggregate in all concrete foundations, walls, floors and fireproofing.

Birmingham Slag Company
Slag Headquarters for the South
ATLANTA BIRMINGHAM THOMASVILLE



Cyclone has kept pace with the textile industry

In few industries has the awakening to the need of adequate fence protection for factory property been so spontaneous as in the textile field. A survey of 40% of this field shows that within the last five years practically as much fence was installed as in the previous 20 years.

Of the total, seventy-five per cent is Cyclone Fence. For the Cyclone Fence Company kept pace with the textile industry. Always a leader in product, it went a step further and offered textile manufacturers an invaluable fencing service that insured the correct solution to every fence problem.

NOW—RUST PROOF FENCE

Cyclone now has gone even further. It is offering a new fence of unequalled durability—Cyclone Chain Link Fence Fabric. Heavily Hot-Dip, Zinc-Coated AFTER Weaving.

This is a rust-proof fence that will last many years longer than ordinary metal fence. The first cost is the last. No annual painting or other upkeep cost. The saving in maintenance soon pays the original cost.

The importance of this achievement in the fence industry may be compared to the cotton gin in the textile world. Fence is a recognized necessity. And Cyclone Rust Proof Fence puts fence maintenance cost on an entirely new and economical basis.

Before contracting for any fence for your factory you should get the facts about Cyclone "Rust-Proof" Fence. Do this in justice to yourself and the organization you represent. Write our nearest offices, Dept. 35, for complete information.

Cyclone "Red Tag" FENCE AND PRODUCTS

The "Red Tag" The Mark of Quality

CYCLONE FENCE COMPANY

Factories and Offices:

Waukegan, Ill.; Cleveland, Ohio; Newark, N. J.; Fort Worth, Texas; Oakland, Cal. (Standard Fence Co.); Portland, Ore. (Northwest Fence and Wire Works).

Cyclone Fence

PROPERTY PROTECTION PAYS

Distributor Service

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Lewis E. Tracy Co.

CHARLOTTE, N. C.
Charlotte Supply Co.

FALL RIVER, MASS.
Wm. F. Harticon

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Alexander Grant's Sons & Co.

UTICA, N. Y.
American Hard Wall Plaster Co.

WOONSOCKET, R. I.
Pinault & Choquette

"Save the surface and you save all"

Night-time Shadows

WHEN night-time shadows fall, artificial illumination plays an important part in maintaining the level of production.

Insufficient or incorrect lighting is a production handicap, easily overcome.

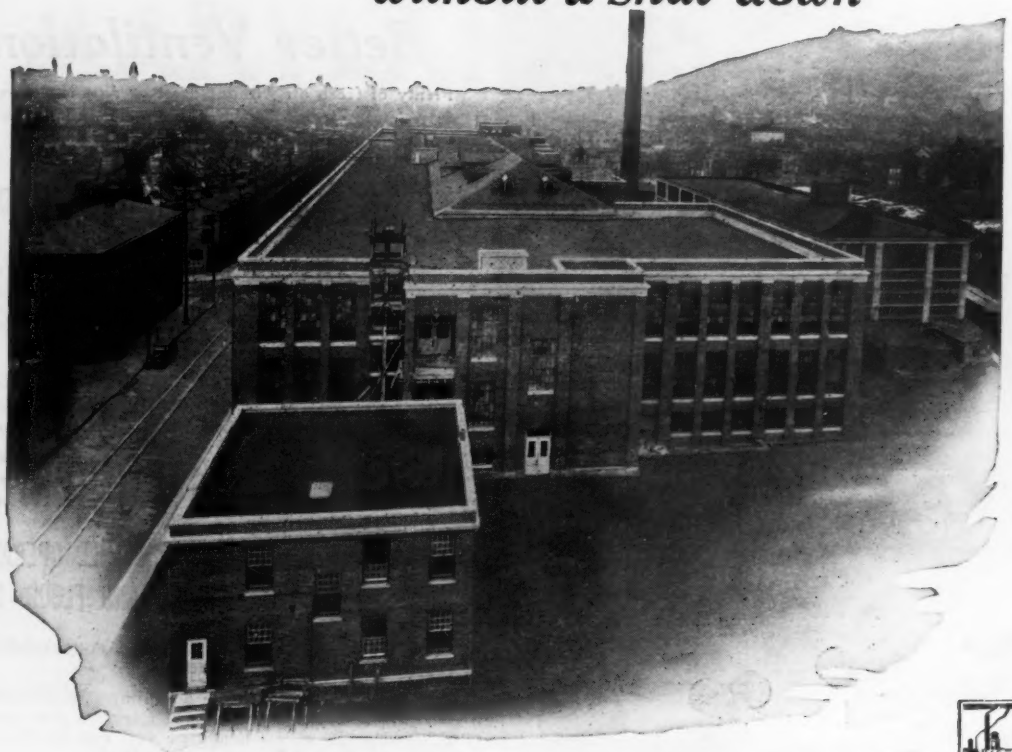
OJACO MILL WHITE on walls and ceilings is the logical solution to your lighting problem. It will lengthen your productive working hours by increasing the effectiveness of your artificial lighting.

For further details about OJACO MILL WHITE, consult any one of the Distributors listed to the left or write direct to us.

Oliver Johnson & Co., Inc.
Paint Makers since 1833
PROVIDENCE, R.I.

SOLVED!

-the old plant re-made without a shut-down



HERE was a mill that had completely outgrown itself. With the demand steadily growing, more production capacity was essential. Yet the company, if it was to continue giving service to its customers, could not afford to close down a single day.

Lockwood, Greene & Co. met the problem by entirely rehabilitating and modernizing the mill, installing a new power plant, new machinery and improving the old. The equipment in the picker room was increased and new pickers were equipped with individual motors. The spinning mill was enlarged with additional frames run by individual chain-driven motors. In the weaving mill, 160 Draper looms were added. These improvements were all made without any interruption of production.

In solving such problems, Lockwood, Greene & Co. have the great advantage of long experience as leaders in textile mill engineering. Hardly a situation arises that does not have its precedent in Lockwood-Greene experience.

Lockwood-Greene service includes every phase of engineering and management from the planning of new mills to the operation of existing plants. Write for "Building With Foresight," which describes what Lockwood-Greene service has accomplished for others. Or, better still, let us discuss with you your particular problems.

BUILDING WITH FORESIGHT

LOCKWOOD, GREENE & CO.

ENGINEERS

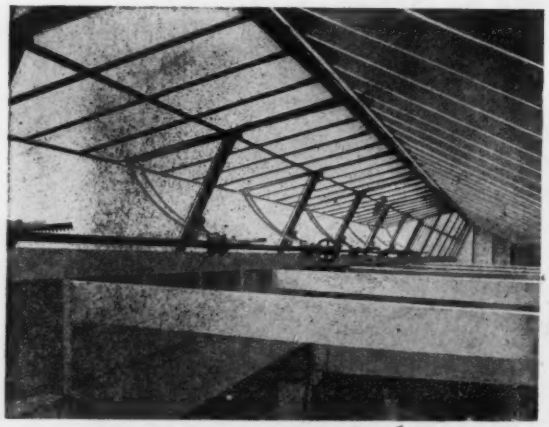
EXECUTIVE OFFICE, 24 Federal Street, BOSTON 9

BOSTON ATLANTA CHICAGO NEW YORK DETROIT
CLEVELAND CHARLOTTE

Lockwood, Greene & Co. of Canada, *Limited*, Montreal; Compagnie Lockwood Greene, Paris, France

GEORGE DOWMAN

610-611 Walton Building, Atlanta, Ga.



Better Ventilation

Plenty of fresh air without draft or dust is a wonderful stimulus to production. Both old and new buildings may be easily equipped with

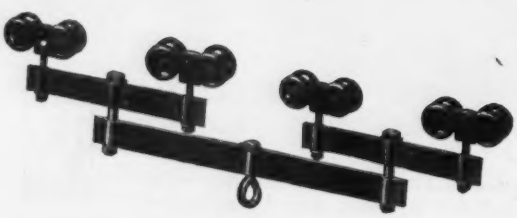
Callahan Sash Operators

For any type of pivoted or hinged wood or steel sash. We have an Engineering Department that will work with you or your architect in the development of plans. Let us give you an estimate.

THE T. J. CALLAHAN CO.

804 S. Perry St. Dayton, Ohio

WAGNER OVERHEAD CONVEYING EQUIPMENT



IS IDEALLY ADAPTABLE TO COTTON MILL OPERATIONS

CONSERVES LABOR---SAVES TIME AND FLOOR SPACE

Do your trucking on the ceiling and consolidate your conveying and hoisting operations.

Wagner Equipment includes a complete line of Switches, Crossovers, Curves, and Cranes. Carriers are equipped with high grade roller bearings and can be furnished with "Hyatt" Roller Bearings if desired.

Write for Catalogue

Wagner Manufacturing Company, Cedar Falls, Iowa.

One of Ten School Buildings

for City of New York in which

BOCA SOLID STEEL SASH Has Been Installed.

For High Class construction, quality and service, you can depend upon Boca Sash.

Catalogue on request.

THE BOGERT & CARLOUGH CO.

Paterson, N. J.

Southern Selling Agent for the Products on These

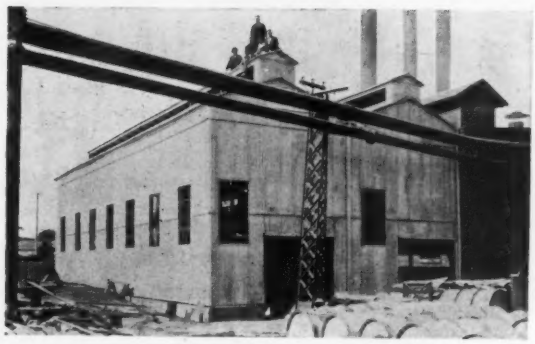
CONTRACTORS AND SALES ENGINEERS

MARYLAND METAL BUILDINGS

Any type, from a Watchman's Station to the largest Plant. Built for Strength and Durability.

Absolute security to equipment, because constructed of LYONORE METAL, a Rust-Resisting Alloy.

Complete buildings carried in stock for quick shipment.



Boiler House Recently Erected By Us.

A MARYLAND METAL BUILDING means minimum investment in fixed assets, a low overhead, and larger working capital. MARYLAND METAL BUILDINGS are easily increased in size, and can be moved at a salvage value of ninety-five per cent. Acquaint us with your plans and we will be pleased to quote prices.

McComas and Race Streets — MARYLAND METAL BUILDING COMPANY — Baltimore, Md.

VARIETY FIRE DOOR COMPANY

61 CROSS-HORIZONTAL FOLDING DOORS
ERECTED ON POSTS 7½ INCHES x 7½ INCHES
AMERICAN RAILWAY EXPRESS COMPANY'S BLDG.
CHICAGO, ILLINOIS

MANUFACTURERS OF A
COMPLETE LINE OF LABELED FIRE DOORS
ROLLING STEEL DOORS
HOLLOW METAL DOORS
KALAMINE DOORS
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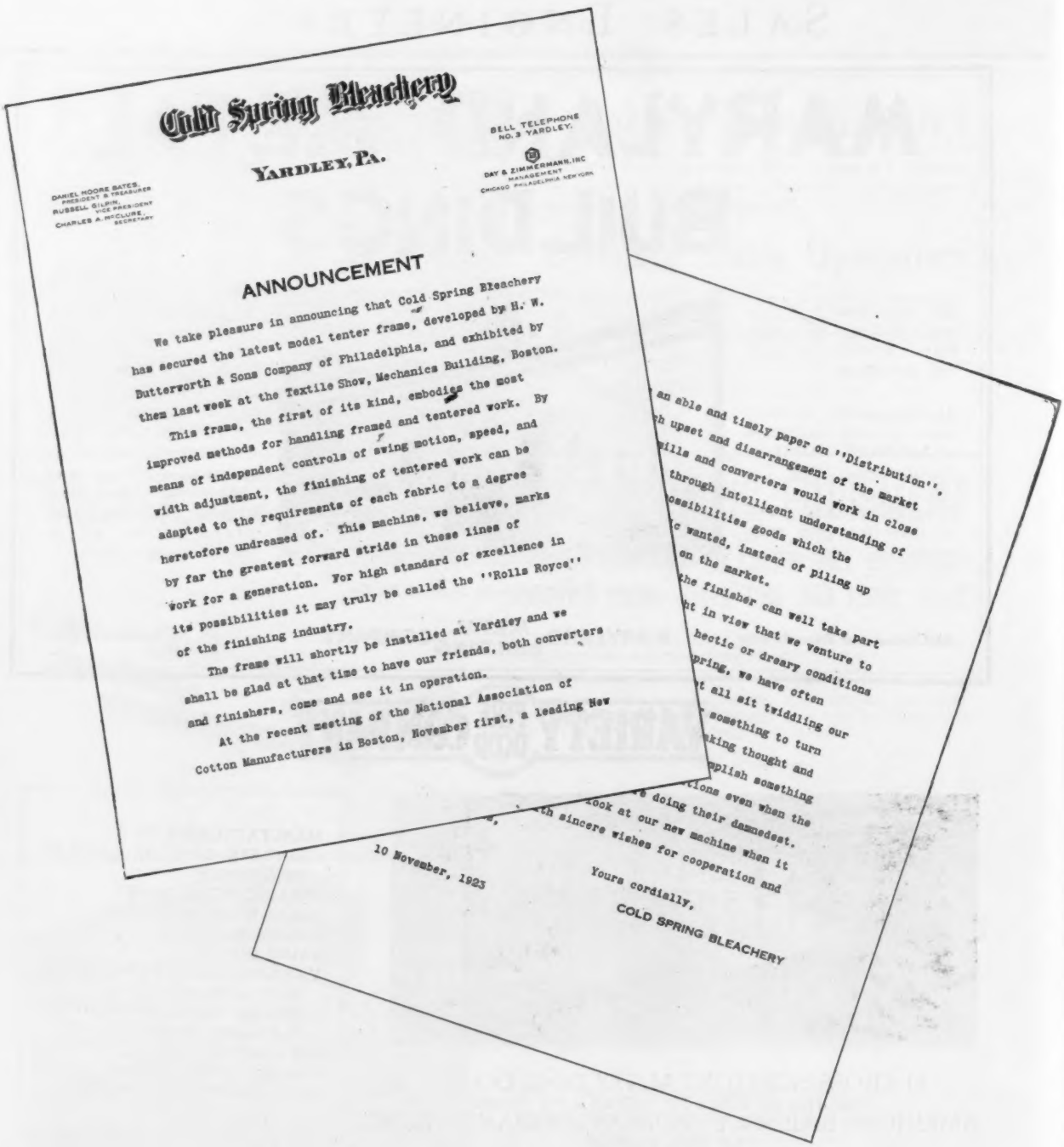
TIN CLAD DOORS
PRESSED STEEL FRAMES
STEEL STOREROOM DOORS

VARIETY FIRE DOORS

2958 CARROLL AVE. CHICAGO, ILL.

An Announcement by the purchaser



Cold Spring Bleachery

YARDLEY, PA.

BELL TELEPHONE NO. 3 YARDLEY.

DAY & ZIMMERMANN, INC MANAGEMENT CHICAGO PHILADELPHIA NEW YORK

DANIEL MOORE BATES, PRESIDENT & TREASURER
RUSSELL GILPIN, VICE PRESIDENT
CHARLES A. McCLURE, SECRETARY

ANNOUNCEMENT

We take pleasure in announcing that Cold Spring Bleachery has secured the latest model tenter frame, developed by H. W. Butterworth & Sons Company of Philadelphia, and exhibited by them last week at the Textile Show, Mechanics Building, Boston.

This frame, the first of its kind, embodies the most improved methods for handling framed and tentered work. By means of independent controls of swing motion, speed, and width adjustment, the finishing of tentered work can be adapted to the requirements of each fabric to a degree heretofore undreamed of. This machine, we believe, marks by far the greatest forward stride in these lines of work for a generation. For high standard of excellence in its possibilities it may truly be called the "Rolls Royce" of the finishing industry.

The frame will shortly be installed at Yardley and we shall be glad at that time to have our friends, both converters and finishers, come and see it in operation.

At the recent meeting of the National Association of Cotton Manufacturers in Boston, November first, a leading New

an able and timely paper on "Distribution",
h upset and disarrangement of the market
ills and converters would work in close
through intelligent understanding of
ossibilities goods which the
c wanted, instead of piling up
on the market.
the finisher can well take part
ht in view that we venture to
hectic or dreary conditions
pring, we have often
t all sit twiddling our
something to turn
king thought and
plish something
tions even when the
e doing their dammedest.
look at our new machine when it
th sincere wishes for cooperation and

10 November, 1923

Yours cordially,

COLD SPRING BLEACHERY

BUTTERWORTH

of the Butterworth new Universal Tenter exhibited at Boston

There is little that we need add at this time except that we will be glad to comply with all requests for our new booklet "Better Tentering." It describes and illustrates the new Butterworth Universal Tenter.

H. W. BUTTERWORTH & SONS CO.

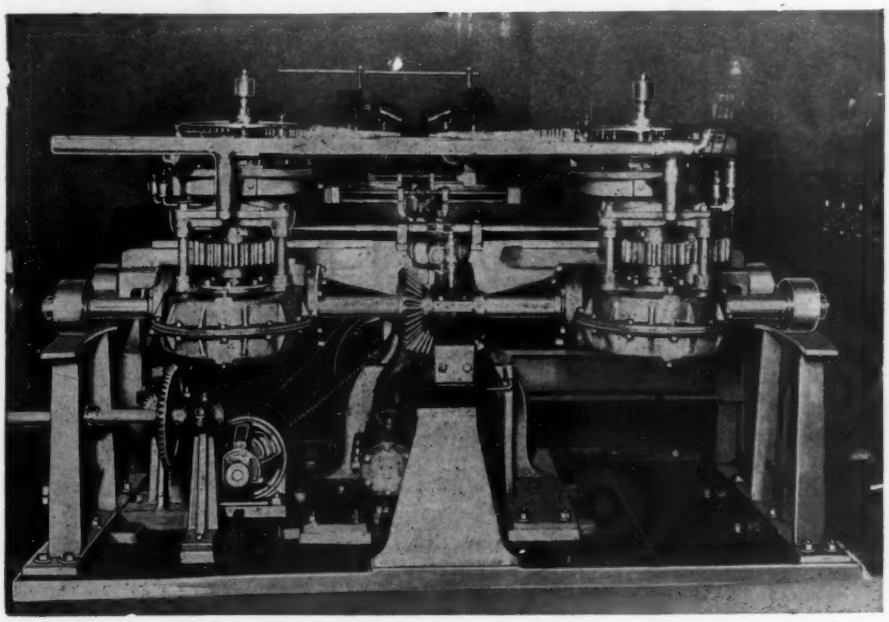
ESTABLISHED 1820

PHILADELPHIA, PA.

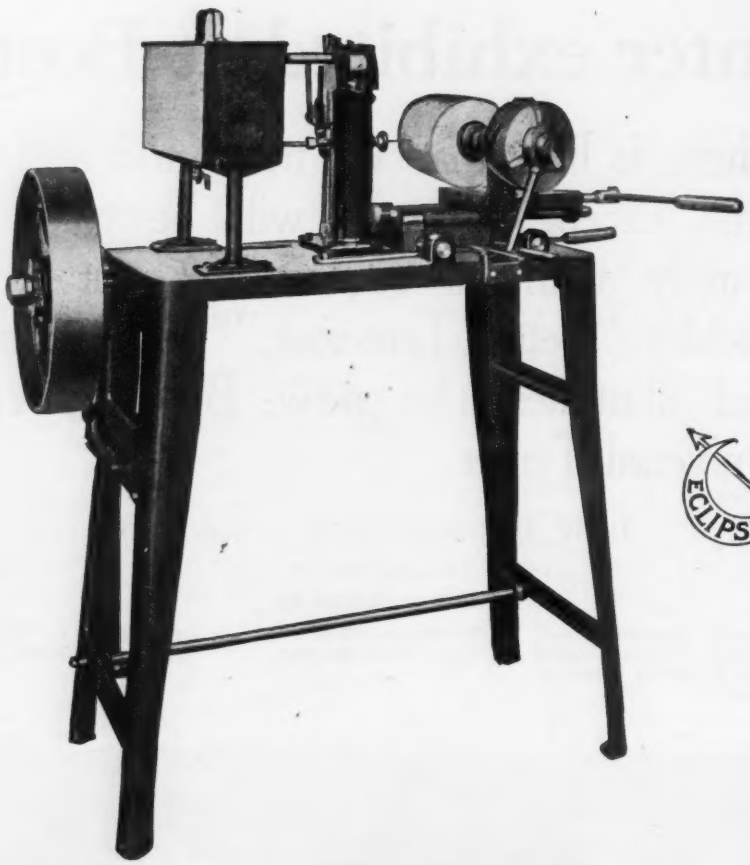
Canadian Representative: Hamilton, Ontario, Canada W. J. Westaway Company.

Providence Office: Turk's Head Building.

Greenville, S. C., Office: Woodside Building.



Finishing MACHINERY



The Eclipse
Automatic Yarn Cleaner

AN entirely new principle is involved in that the yarn is cleaned by flexible blades which vibrate constantly. This device is small and compact and easily attached. The strength and elasticity of the yarn is not affected in the slightest.

ECLIPSE VAN NESS Dyeing Machines

Random Dyes, Cotton, Wool or Silk yarn on the cone by injecting the dye into the cone under pressure.

Write for full data

ECLIPSE TEXTILE DEVICES, INC.

Makers of

Eclipse Automatic Yarn Cleaners | Eclipse Automatic Stop Motions | Eclipse Yarn Tension Devices

ELMIRA, N. Y.

THE NEWPORT COLORS

Made in the U. S. A.

Newport Service

Modern American Dyestuff firms are much more than mere factories. They are veritable institutes of textile technology where the problems of better decoration and clothing of civilization are constantly and intensively studied and researched culminating in results of great importance to mankind and therefore vital to those engaged in textile production. When Newport advertises co-operation it means something.

NEWPORT
REG U S. PAT OFF
"COAL TO DYESTUFF"

Newport Chemical Works, Inc.

Passaic, New Jersey

BRANCH OFFICES: Boston, Mass.; Providence, R. I.; Philadelphia, Pa.; Greensboro, N. C.; Chicago, Ill. Schenectady, N. Y.; Charlotte, N. C.; Springfield, Mass.

WAREHOUSES: Boston, Mass.; Chicago, Ill.; Greensboro, N. C.; Philadelphia, Pa.

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Over a Span of 51 Years
TO the unerring progress of Chemical control, the major productive powers of the Industrial World owe their full development.
Our contribution to this dynamic force spans a period of over a half century.
With justifiable pride, we therefore invite participation in a Chemical Service touching upon practically every phase of Industrial application—striking the highest average of successful attainment.
FOR TEXTILE MANUFACTURERS
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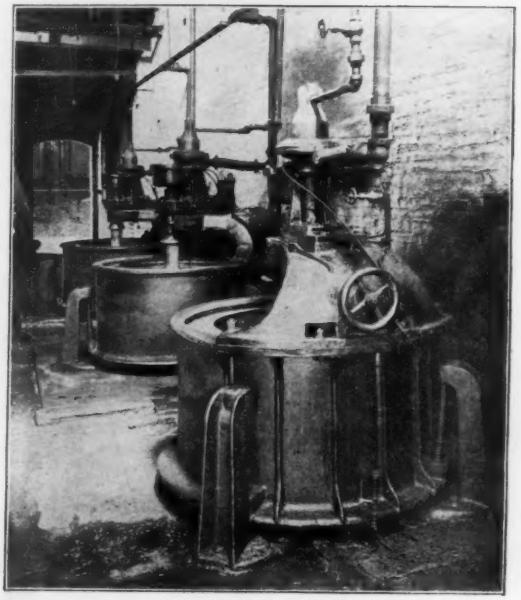
53% Per Annum

on their Investment



THE stride of modern industry is rapid. Machinery which was the best of its kind ten years ago is often rendered obsolete by new designs and types.

Two years ago the Victor Dry Works of Philadelphia replaced their obsolete engine-driven extractors with the modern Fletcher Turbine Driven Extractors, in spite of the fact that the former had a book value of $1160.00. A survey discloses that the Fletcher Turbine Driven Extractors do the work in 1¾ hours less per day, thus saving $1092.00 a year in the wages of three men who operate the extractors and the yarn drier; the saving in steam consumption is $1,478.75 a year and in repair parts and labor $566.00 per year—

A total annual savings of $3,165.75
53% on the investment

This repaid the book value of the old extractors in 4½ months.

Every user of extractors should have on his desk a copy of this survey, which tells in complete detail how these savings were made.

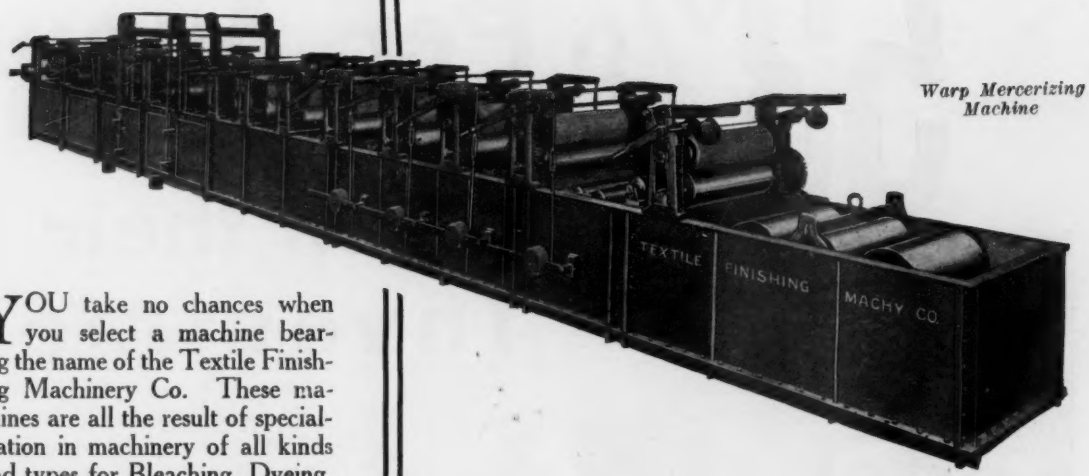
WRITE TODAY!

FLETCHER WORKS

(INCORPORATED)

Formerly SCHAUM & UHLINGER

Glenwood Avenue at Second Street **PHILADELPHIA, U. S. A.**



Warp Mercerizing Machine

YOU take no chances when you select a machine bearing the name of the Textile Finishing Machinery Co. These machines are all the result of specialization in machinery of all kinds and types for Bleaching, Dyeing, Drying, Mercerizing, Singeing and Finishing Textile Fabrics and Warps.

Our Specialties are Upright and Horizontal Dryers, Warp Mercerizing Machines, Singers, Kiers, Washers, Squeezers, Scutchers, Dye Jigs, Mangles, Calenders, Tenters, Color and Size Kettles, Warp Dyeing Machinery, Elastic Web and Narrow Fabric Finishing Machinery, Calender Rolls of Cotton, Husk, Paper and Patent Combination.

MAIN OFFICE AND WORKS
PROVIDENCE, R. I.

NEW YORK OFFICE
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THE
TEXTILE-FINISHING
MACHINERY
CO

CANADIAN REPRESENTATIVE
WHITEHEAD ENMANS, Ltd.
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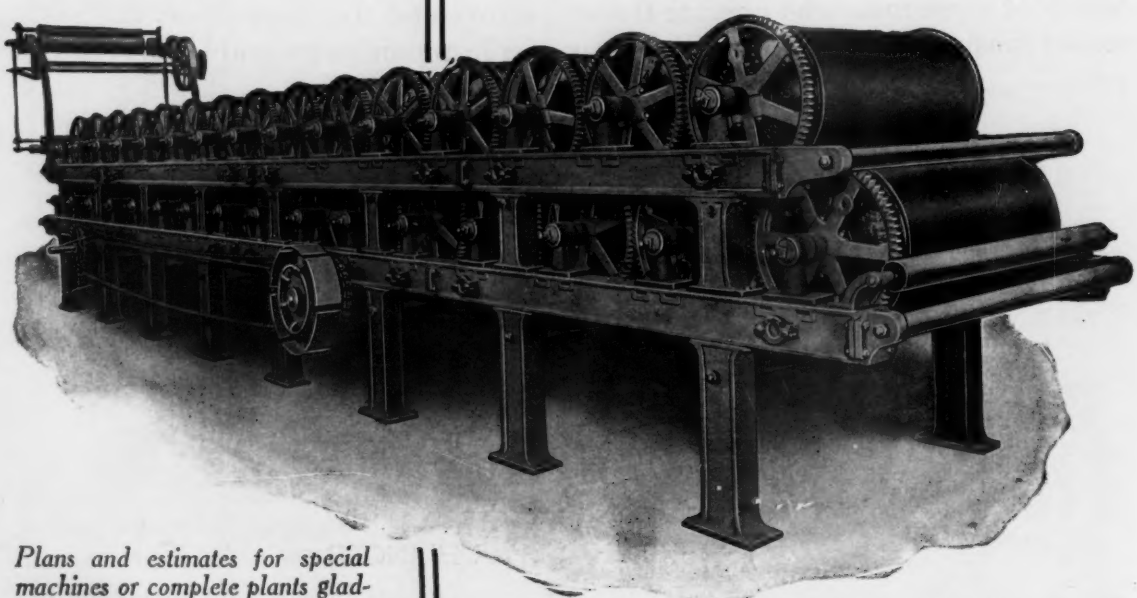
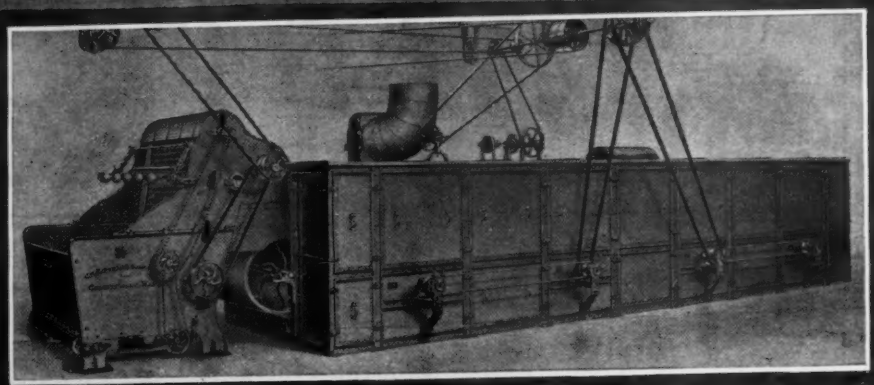


Thirty-one Cylinder Horizontal Dryer

Plans and estimates for special machines or complete plants gladly furnished on request. Send us your Inquiries.

SARGENT DRYERS



FOR DRYING
WOOL
COTTON
HAIR
Etc.

SARGENT DRYERS combine principles of air circulation and conveying that engineers and mill men have been quick to recognize.

They have preference, surely, and why not?

With such excellent features as cast iron frame, automatic feed, ball bearing fans, perfect circulation, rapid exhaustion and drying with a minimum temperature, a uniformity of results is obtained. A new feature, "the swingshelf conveyor, has been added, which makes Sargent Dryers even more of a valuable investment.

To restore the proper degree of moisture and thoroughly and uniformly condition your yarn, remember the SARGENT Yarn Conditioning Machine. It assures no more "Kinky Filling"—a thorough, rapid and accurate conditioning of your filling yarn.

Our Southern Agent is at Charlotte,
Mr. Fred H. White.

C·G·SARGENT'S SONS CORP.
GRANITEVILLE, MASS.

VICTOR MILL STARCH

"The Weaver's Friend"

It boils thin—it penetrates the warps—increases breaking strength and carries the weight into the cloth. Being thoroughly washed free of gluten and other foreign matter it gives a bleach and finish to the goods that you can get from no other starch.

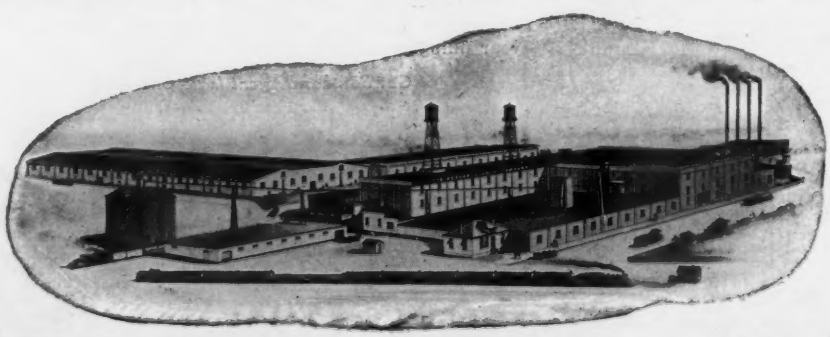
A trial order will convince you that VICTOR STARCH has no equal on the market.

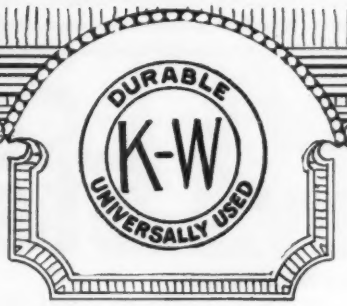
The Keever Starch Co.

Columbus, Ohio

Southern Agent: MR. DANIEL H. WALLACE, Greenville, S. C.

If you are not already using VICTOR STARCH call on our representative for a demonstration at your convenience.





"The World's Best Dyeing, Bleaching and Scouring Machinery."

"The World's Best Dyeing, Bleaching and Scouring Machinery."

A Mark
That Means Intrinsic Value

The hundreds and thousands of Klauder-Weldon machines now in use have, by their accomplishments, steadily and irresistibly built up a reputation that has made "K-W" synonymous with the "world's best Dyeing, Bleaching and Scouring Machinery."

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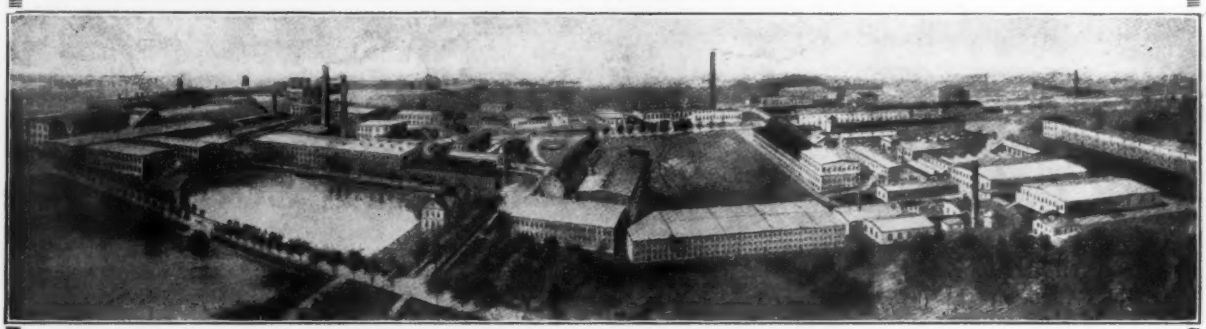

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With the Publishers—

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What This Issue Means

The prime reason for a Twenty-Fifth Anniversary Number is, naturally, that COTTON is twenty-five years old. But in presenting this number and its contents to you it has been the aim of the Editorial Department to show something of the growth and development of the industry COTTON has served during the quarter of a century paralleling its own life.

It has been impossible to present all the angles of this development in the limited time and space available, just as it has been impossible to present, photographically, examples of growth and progress from each deserving mill, therefore the "high spots" in the development which have been brought out, like the pictures used, merely represent "types" that might have been many times multiplied by a mere multiplication of individual effort on the part of the editors.

The real values to be drawn from the facts and figures presented are the basic trends underlying the industry during this period. These show a steady angle of growth that is still going upward; and from these the probable future of the South as a textile industrial section may be charted with reasonable accuracy.

Just as the community house shown at the top of this page depicts a remarkable advance over the village methods in use twenty-five years ago, when the nearest store usually served as a gathering place, so does a like advance develop in almost every item of technical or social usage if the figures are secured and carefully followed through.

But the greatest achievement to be credited to these forward looking mill owners and managers does not lie in their wonderful mills; nor in the number of schoolhouses they have built; nor in the teachers they have hired; nor in any other single development they have advanced; it is the composite effect of all of these things and many others they have advocated and aided that has done much to raise the South and its people from the depths of the reconstruction period following the war between the States to their present industrial opulence and educational enterprise. They have built not alone a business, but a people.

AMONG COTTON'S READERS

L. W. Robert, Jr., President,
Robert and Company, Incorporated,
Architects and Engineers,
Atlanta, Georgia

"I consider that COTTON has been foremost in promoting the development of the textile industry in the Southeast, and is itself a great credit to the industry it represents. Personally, I enjoy each issue more and more."

Chas Robert

1898 1923

A YARDSTICK of TEXTILE PROGRESS

TWENTY-FIVE YEARS of SOUTHERN TEXTILE GROWTH AS INDICATED BY A COMPREHENSIVE SURVEY MADE IN THE FIELD

By Frederick H. Mc Donald

Today's prophet is received, if not with scorn, at best with skepticism—even though tomorrow we awake to the realization of his vision. So subtle is the process of change and growth, we may even ourselves be contributors to a given development without realizing the full import of the cumulative effect that time and the efforts of others pile up in a suddenly startling revelation of achievement.

As long as thirty years ago a group of staid New England manufacturers and capitalists visited the then more potential than actual southern textile field—saw the possibilities, and were conquered to the extent of five million dollars worth of investment in new mills. Prophetically, they visioned the development of today—and were ridiculed for their temerity.

Even now there is a lack of appreciation not only of the growth of the industry in the South, but of the completeness, the up-to-date-ness, and the thoroughness with which the mills of the South have not only grasped the fundamental opportunities of location, but have kept pace with the economies and benefits to be derived from the developments of science, skill and technique in the management of their processes and their labor.

In an effort to visualize exactly what the developments of the last quarter of a century have been in the field of southern cotton manufacture, this article has been undertaken.

Records of progress are so seldom made step by step that we mostly have to get our history in retrospect. There have been isolated annual reports, and occasional surveys of the numbers of mills, spindles, looms, etc., but there is a lack of any light on the degree to which these mills have profited by the developments within the industry, and applied them to their own processes. Starting out often with limited capital, in a section of the country not specifically devoted to the advancement of mechanical development, many of the mills of the South first consisted of the bare essentials only. An impression gradually arose, and was accepted as general, that the southern mills were crude, inefficient, and committed to a haphazard, and even slovenly form of management.

It is to forever squash this idea, that this article is written.

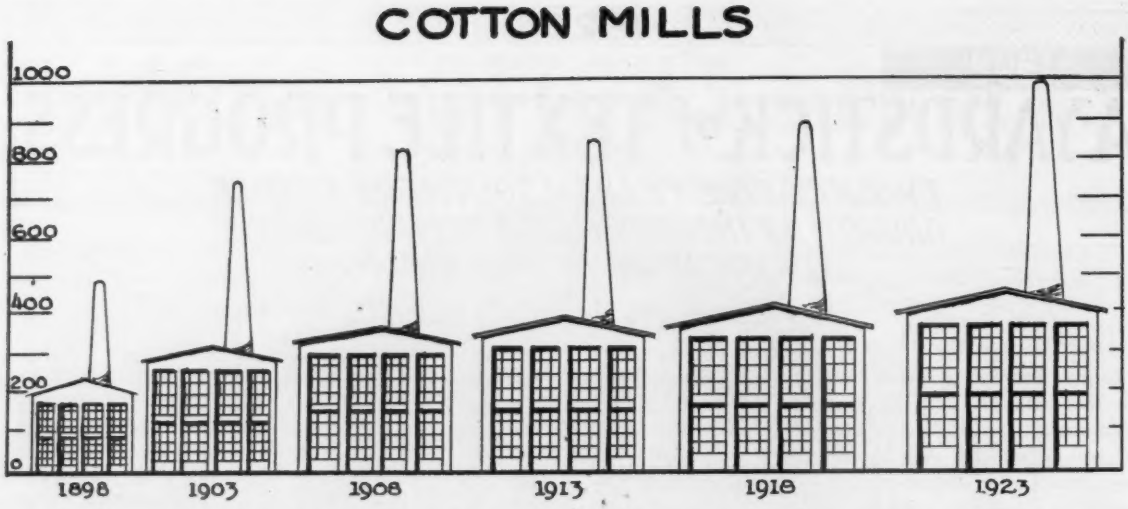
Through the courtesy of Henry G. Hester, secretary of the New Orleans Cotton Exchange, who gave access to his personal files, figures were obtained relating to the general growth of the industry as evidenced by the yearly addition of mills, spindles, and looms, and the annual increase in cotton consumed. This steady advance is, in itself, a physical accomplishment which in twenty-five years has quadrupled the number of southern spindles from 4,057,044 to 16,778,144, and has resulted in an investment that can be conservatively figured at a billion dollars—an amount of money equal to nearly a third of the actual cash held today in the vaults of the entire Federal Reserve banking system. The number of looms has grown from 104,446 to 303,677. The total amount of cotton consumed by southern mills, starting with approximately 650 million pounds for the year ending August 1, 1899, has reached the almost incomprehensible figure of 2,139,344,944 pounds—or over four and a quarter million bales—for 1923. In this time the number of mills has doubled from 401 to 989 with a probable manufacturing floor space certainly of a hundred million square feet.

At this same rate of increase, the South in the next *ten to fifteen* years will have as many operating spindles as there now are in the entire United States. It is a matter of common assumption that the present total number of spindles in the whole country can more than take care of our domestic requirements. This then seems to mean that, even taking into consideration the annual increase in population, and to the notable tendency of the wants per individual to increase, that if the present rate of southern spindleage increase continues, the mills of New England or a large portion of the then mills of the South, will be an excess over the possible requirements of those who now buy from the products of domestic mills.

This would indicate that either there must be a decrease in this rate of increase in southern spindles, an abandonment or transfer of New England spindles, or some answer that is not indicated by these alternatives. The first possibility is not very likely to any large extent, due to the admitted differential the South now offers to economy of manufacture as compared to New England. The second—the abandonment or transfer of New England spindles—is clearly under way to some degree. Both of these factors, then, will continue, but not to the utter extinction or removal of New England spindles—not by a long shot!

Under conditions of excess productive capacity, as will continue as long as the world demand is in its present state of curtailment, cheaper products will result than if a larger market made competition less keen. This will continue, even in the face of high labor and material costs; for the more efficient manufacturers will begin to set the pace and the price. And this circumstance, to a large degree, is going to be the key to profitable manufacture for many years in the future.

This means that there will be a clean-out of the less efficient and out-of-date plants, which under the newer and highly competitive regime cannot exist. Quantity production; expensively installed labor, material and cost saving



devices will be more and more the necessary role, which forecasts mergers and larger single organizations.

Gradually, the types of goods now produced in New England that can be produced in the South more cheaply will be produced largely in the South. It will remain for the New England manufacturer to find types of product that he can produce at an equal cost, or more cheaply than his southern competitor. This possibility is conceded, for many years, in the finer textile goods in product and in finishing, because of the necessity of training southern labor to this type of work. This is the field now held partly by New England, but to a larger degree by England. While the South rapidly increases its own spindles on the coarser goods and gradually gets into the finer, New England can drop the coarser entirely, go full speed into the finer lines —and supply the markets now supplied only in part by its own spindles, and to a certain extent by English mills.

There is hope then for both sections of the country in the changes now under way. The efficient plant operating with the highest economy will come into its own—in both the South and New England. And there will be a dual change of types of product in both sections, bringing over to this country as a net gain a large part of the markets now supplied by English and Continental spindles.

This brings logically to mind the question—what has the South done to prepare itself for this highly competitive warfare? How much has it been in step with modern progress in handling its machine processes, its labor, and its management? How well is it already equipped to meet these rigorous conditions—in view of the sometime prevalent conception that it is the backyard of the industry as far as progress and up-to-date-ness is concerned? What about these sluggish and lazy overseers and operatives of which so much has been said? These illiterate and back-

STATISTICS OF THE COTTON MANUFACTURING INDUSTRY

In All Cotton Producing States

	Year Ending August 1st 1898
Mills	491
Spindles	4,057,244
Looms	96,541
Cotton Consumed (Lbs.)	522,946,808

	Year Ending August 1st 1899	1900	1901	1902	1903
Mills	550	663	688	716	740
Spindles	4,952,092	6,267,163	6,531,894	7,512,982	8,248,275
Looms	104,446	121,923	132,991	152,963	171,441
Cotton Consumed	649,992,749	742,170,822	755,628,228	902,413,488	939,965,043

	1904	1905	1906	1907	1908
Mills	762	777	794	814	833
Spindles	8,615,369	9,205,949	9,760,192	10,598,095	10,661,308
Looms	185,144	201,054	206,637	215,889	220,289
Cotton Consumed	900,878,944	1,024,003,410	1,125,583,068	1,148,932,756	1,032,285,100

	1909	1910	1911	1912	1913
Mills	841	841	840	842	841
Spindles	11,255,787	11,255,787	11,897,414	12,318,356	12,819,333
Looms	219,563	219,563	236,886	249,479	256,756
Cotton Consumed	1,206,894,780	1,122,327,849	1,113,388,633	1,290,062,813	1,403,858,781

	1914	1915	1916	1917	1918
Mills	841	851	860	879	889
Spindles	13,199,426	13,346,480	13,900,286	14,500,999	14,786,262
Looms	263,556	266,241	270,595	277,871	288,319
Cotton Consumed	1,433,100,098	1,506,335,131	1,912,155,889	2,059,158,467	2,052,647,174

	1919	1920	1921	1922	1923
Mills	910	945	957	966	989
Spindles	15,187,319	15,657,951	15,891,616	16,232,624	16,778,144
Looms	285,057	281,618	290,197	298,060	303,677
Cotton Consumed	1,680,716,672	1,754,724,421	1,477,345,267	1,871,836,572	2,139,344,944

ward mill communities? These inadequate and poorly equipped plants down in this neck of the woods?

COTTON, having heard these rumblings of supposed backwardness for a long, long time, did a broadcasting stunt in the form of a long series of earnest queries, sending a questionnaire to, roughly, a thousand mills. More than forty per cent of the spindles in the South were represented in the answer—which like a rumble of protest came sliding in with facts, figures and illustrations, covering a quarter of a century's history of southern mill progress. Using this percentage as a basis, close estimates, with such allowances as seemed reasonable, were made to get figures covering the entire southern spindleage—and to the charge of backwardness, decreptitude, incompetence and sluggishness comes in a howling denial in cold figures to the tune of—almost—"Hell, there ain't no such animal!"

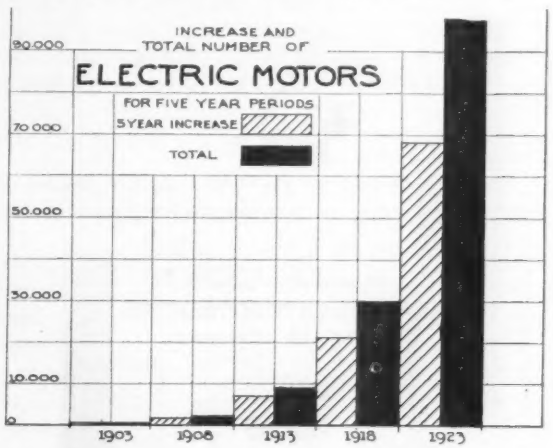
It has not been thought necessary to discuss every factor involved in cotton manufacture or mill construction in this article. There are certain necessary parts that are always indicated by any measurable index of the whole. The bare statement of the number of spindles, for instance, automatically indicates the presence of so many attendant parts in machinery, equipment, and supplies.

The real gist of this discussion is an attempt to measure the growth in the unnecessary but advantageous elements that accompany the necessary. For real progress is the result of mental attitude—of an openmindedness that recognizes above bare essentials the contributory part that even the intangibles can play in successful accomplishment.

One of the greatest advances in industrial mechanical efficiency is the use and application of the electric motor. The degree with which its many advantages in cost reduction is accepted by a given group, is, in a way, a barometer of that group's progress. For the first five years of the last quarter century, in the South, there were installed only 294 electric motors. The next five years saw this rate increased nearly six times to 1,775. This last rate was nearly quadrupled to 6,752 between 1909 and 1914. The last two sets of five year periods both saw a tripling of the previous rates, with 21,135 between 1914 and 1919, and 68,107 in the last five years including 1923. For the entire twenty-five years there were 98,053 motors of varying capacity installed in the South!

A recent estimate made by a well known southern electrical engineer credited over ten million southern spindles as being electrified, amounting to sixty per cent of the entire number in the South. These would take around half a million horsepower, which if generated in a single plant, would be as large as the mammoth River Rouge plant now under construction for the Ford Motor Company, which will use, on a basis of exceptional efficiency, 7,500 tons of coal a day!

It will be noted from the foregoing figures, taking the number of motors installed and the horsepower consumed, that the average horsepower per motor is small, running close to five horsepower. When the known large number of big capacity motors is considered, there must be quan-



tities of the smaller motors to bring the average to so low a figure.

Individual and group drives is the answer—an assumption borne out by actual figures from a mill which reported 264 five-horsepower motors, and only 40 ranging from 15 to 200 horsepower. This is a tendency toward efficiency, flexibility, and control that will be more and more productive of southern mill prestige as passing time sees its further adoption.

Along with the advantages to be gained by electric drive seems to have been a sound appreciation of those other efficiency gainers, chain drives and ball bearings. These both began to put in appearance around 1909 but gained no large acceptance until the five years covered between 1914

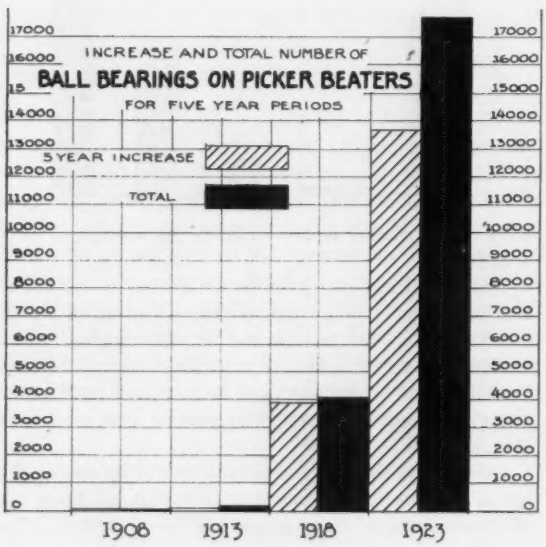
and 1919 when 1,757 chain drives were installed, and 9,156 ball bearings on shaft hangers; picker beaters, aprons and eveners; slasher cylinders; card cylinders; warper measuring rolls; and numbers of other places, were put in use. In the last five years there were 13,000 chain drives installed, or about one in every five motors. The number of new ball bearings used in the same period made the total in use to date over 75,000.

We thus find the southern mills ample recognizers of that very sluggishness they themselves have often been accused of and that they are ready exterminators of that great mechanical laggard—silent, unseen, but insistently destructive—friction.

From the writer's personal observation, the rate of use of ball bearings and particularly chain drives is today even larger than is indicated by the last five year average, it being accepted as good engineering practice on new installations.

Next to mechanical efficiency, the largest cost reducing factor is labor efficiency.

Probably because of the comparative cheapness of southern mill labor, and the comparatively small amount

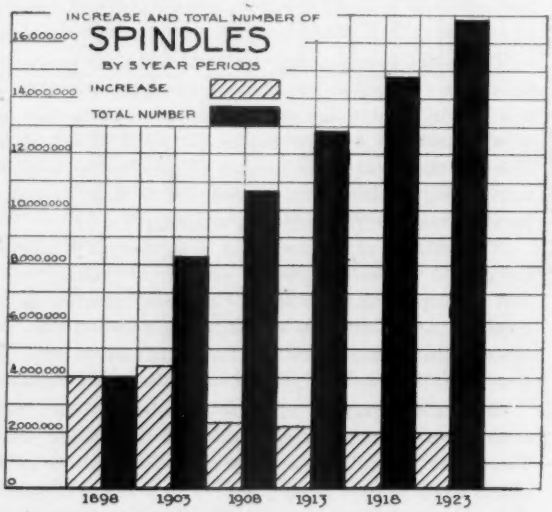


needed in cotton mill operation, the problem of saving in this field seems to be just beginning to get the consideration it deserves.

The growing scarcity of common and semiskilled, and particularly highly skilled labor in the entire country is not going to be bettered by the tendency to limit both the number and kinds of additional labor through immigration. The field, then, for the replacing of labor, and the more efficient use of that still obtainable, by the introduction of mechanical material-handling systems and labor saving devices is pregnant with unlimited opportunity both for the ingenuity of the manufacturer of this equipment, and for its users.

There are today only one or two mills that are taking full advantage of mechanical conveying systems, and other available methods which would reduce the amount of intra-plant hauling. Our survey shows that intra-plant electrical trucks are beginning to work into the mill game, but at the comparatively low rate of five a year for the last five years, with a total number now used of thirty-five. Aside from the actual machine tenders and the moving of goods and supplies, the largest field of labor in a cotton mill is the common labor generally used in keeping the mill and premises clean and in good order. In this latter respect the advantages of floor-scrubbing machines, other than the usual hand-flushing and mopping methods, seem to be growing as is indicated by the existence of nearly two hundred mechanical scrubbing machines in the South.

While large numbers of hand trucks are being used at the rate of over two hundred and fifty a year, the advantage of elevating trucks in handling and storing baled goods and for other purposes appears to be readily recognized, as there are approximately two hundred and fifty now in use. Chain hoists save many broken backs, and are



being used at the rate of two hundred new ones every year, with a total installation of nearly three thousand in the South.

The machine shop is coming in as a time saver, and in the reduction of number of hours shut down on account of broken machinery, by the use of welding equipment. The acetylene torch apparently began to come into use between 1904 and 1908, and for the last ten years has been added at the rate of forty a year. Electrical welding equipment is an accepted product of the last five or six years, with a total now in use of thirty to date.

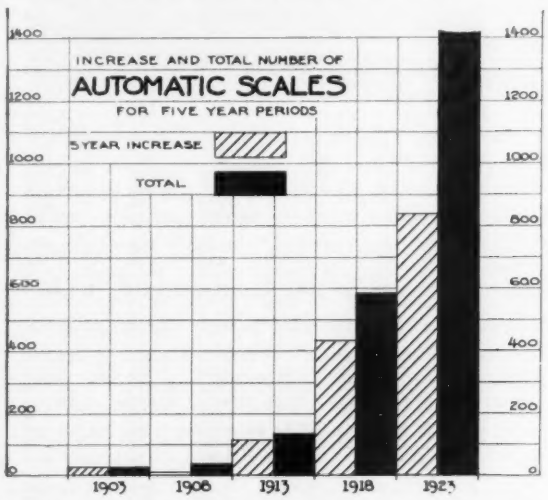
Other labor saving devices applicable more to the field of administrative time are shown by the use of adding and calculating machines at the rate of fifty a year with a total of over eleven hundred adding machines and nearly eight hundred calculating machines in use today. Both of these average at the rate of nearly one in every mill in the South. The newer development, in this field, of bookkeeping machines is coming into use at a rapid rate with a total installation of seventy-three.

Automatic scales as time savers and helps to accuracy are coming more and more into use, the 847 installed in the last five years being in excess of the 730 plain scales.

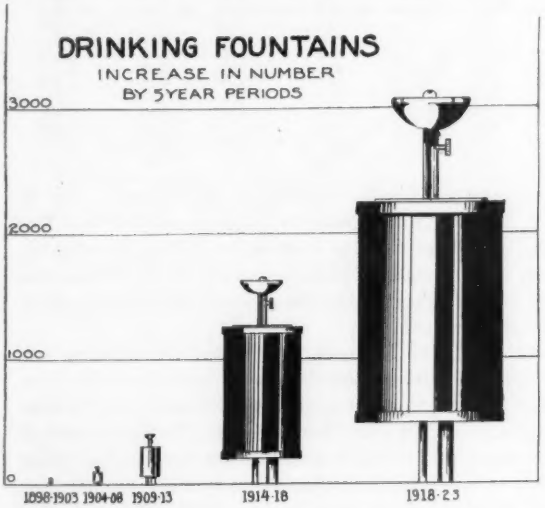
There is no greater money saving factor in the modern industrial plant than the elimination of waste, and a real opportunity for conservation is found in the boiler room and its adjuncts. As far back as 1904 temperature regulating and recording devices began to make their appearance. In five years between 1904 and 1908 there were seventeen

regulators and ten recorders installed. This has increased at such a rate that in the last five years there were 645 regulators and 485 temperature recording instruments used in southern mills either directly in the power plant or in its steam using neighbor, the slasher room. This is an indication of the application of scientific observation and control which is thoroughly in keeping with the most advanced management.

While considering the efforts in behalf of the convenience and comfort of operatives, it is well to point out that there is no greater example of direct saving, in wasted



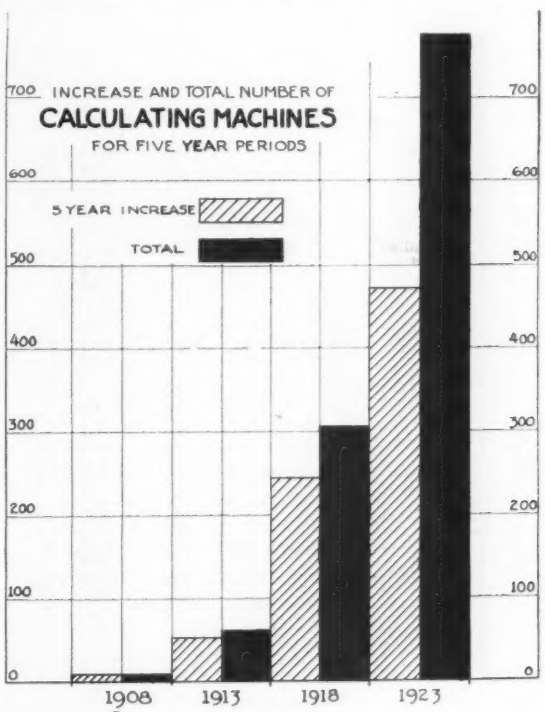
time, than is offered by the use of drinking fountains. There seems to have been some appreciation of this as far back as the five years following 1898 when thirty-seven were installed. Both the rate of increase and the actual number now in use show tremendous growth, giving an average for the last five years of over three new installations for every



mill in the South, with a total installation to date of over five thousand fountains. While an item of comparatively small expense, the importance of this is large as is indicated by the growing appreciation of southern management to the value of even small time saving, and comfort producing devices.

Another indication of the belief in the indirect reduction of operating cost is the increase in the now practically universally used machine guards. It was not until well after 1900 that these began to come into use, but they are now being installed close to the rate of one thousand a year, with eleven thousand of them now in use in the South. The presence of these accident prevention guards automatically indicates the extent of the appreciation of the benefits derived in considering the safety of the operatives. Undoubtedly this may be taken as a barometer, and probably indicates the use of all the other usually accepted accident reducing factors.

Next to labor saving devices comes for consideration the degree to which southern mills exert themselves to make their labor content and comfortable. The operatives in southern mills are, as a rule, resident near the mill, on mill property and in mill owned houses. The mill and its village form a community, not only of property, but of interests, and there is a direct by-product in the loyalty, de-



crease in turnover, and controllability of the workers not obtainable under conditions where the operatives are scattered residents in an adjacent town.

Within the mill, in addition to the large number of drinking fountains, modern toilet and wash room facilities are being everywhere adopted. An excellent index to this trend is the more than two thousand shower baths that have been installed, nearly 1,100 of them in the last five years. Beginning inside the last ten years 5,704 metal lockers have been provided to take care of the operatives' personal effects during working hours. These things are an indication of a widespread appreciation of the benefits of orderliness and sanitation. It may be assumed that they are indexes of other applications of this idea in southern mill management.

In the field of community and group benefits, there is a

Some Statistics in Tabular Form.

	1898—1903		1904—1908		1909—1913		1914—1918		1919—1923	
	Five Yr. Additions	Accumulative Totals	Five Yr. Additions	Accumulative Totals	Five Yr. Additions	Accumulative Totals	Five Yr. Additions	Accumulative Totals	Five Yr. Additions	Accumulative Totals
Adding Machines	40	40	62	102	200	302	335	637	485	1,122
Calculating Machines	.....	.....	8	8	52	60	245	305	472	777
Acetylene Welding Equipment	.....	.....	5	5	45	50	200	250	215	465
Electric Welding Equipment	.....	.....	.....	.....	.....	.....	2	2	30	32
Inter-Plant Electric Trucks	.....	.....	.....	.....	.....	.....	10	10	25	35
Temperature Regulators	.....	.....	17	17	75	92	267	359	645	1,004
Temperature Recorders	.....	.....	10	10	30	40	117	157	485	642
BALL BEARINGS—										
On Shaft Hangers	.....	.....	10	10	172	182	2,042	2,224	8,762	10,986
On Picker Beaters	.....	.....	60	60	95	155	3,885	4,040	13,680	17,720
On Picker Aprons	.....	.....	.....	.....	.....	.....	555	555	10,208	10,763
On Picker Eveners	.....	.....	.....	.....	.....	.....	150	150	5,925	6,075
On Slasher Cylinders	.....	.....	.....	.....	115	115	265	380	480	860
On Card Cylinders	.....	.....	.....	.....	.....	.....	130	130	1,484	1,614
On Warper Measuring Rolls	.....	.....	.....	.....	170	170	220	390	2,805	3,195
Elsewhere	.....	.....	.....	.....	.....	.....	1,287	1,287	22,555	23,842
Bookkeeping Machines	.....	.....	2	2	8	10	8	18	55	73
Chain Drives (Number)	.....	.....	.....	.....	17	17	1,757	1,774	12,952	14,726
Plant Telephone Systems	2	2	10	12	25	37	67	104	95	199
Pick Counters (Number)	.....	.....	2	2	12	14	1,142	1,156	15,762	16,918
Other Counters (Number)	940	940	1060	2000	2,407	4,407	4,820	9,227	7,722	16,949
Cloth Testers	12	12	27	39	40	79	85	164	105	269
Yarn Testers	110	110	77	187	112	299	107	306	190	496
Drinking Fountains	37	37	132	169	390	559	1,650	2,209	3,097	5,306
Woven Wire Fence (Linear Feet)	.....	.....	58,700	58,700	121,700	180,400	306,970	487,370	469,122	956,482
Floor Scrubbing Machines	.....	.....	.....	.....	2	2	35	37	154	191
Hoists (Chain)	340	340	255	595	300	895	752	1,647	998	2,645
Metal Lockers	.....	.....	.....	.....	.....	.....	972	972	4,732	5,704
Machine Guards	.....	.....	88	88	690	778	5,445	6,223	4,440	10,663
Motion Picture Machines	.....	.....	.....	.....	20	20	80	100	102	202
Electric Motors	294	294	1,755	2049	6,752	8,801	21,135	29,946	68,107	98,053
MUSICAL INSTRUMENTS—										
Pianos	10	10	17	27	27	54	170	224	252	476
Organs	.....	.....	12	12	15	27	17	44	20	64
Bands or Orchestras (Number and Total Instruments)	7-148	7-148	7-130	14-278	15-337	29-615	35-660	64-1,275	107-3,070	171-4345
MILL VILLAGES—										
Number of Houses	19,280	19,280	12,280	31,510	8,532	40,042	16,140	56,182	24,705	80,889
Number Fitted With:										
Running Water	795	795	662	1,457	2,877	4,334	18,437	22,771	31,285	54,056
Bath	15	15	145	160	87	247	2,700	2,947	8,825	11,772
Toilet	190	190	507	697	1,730	2,427	11,755	14,182	22,882	37,964
Electric Lights	182	182	1,695	1,877	5,817	7,694	22,152	29,816	38,502	68,318
Churches	122	122	127	249	125	374	95	469	197	666
Cement Sidewalks (Linear Feet)	.....	.....	.....	.....	56,772	56,772	528,595	585,369	1,242,182	1,827,549
Cement Streets (Linear Feet)	.....	.....	.....	.....	13,100	13,100	51,450	64,550	403,125	467,675
School Houses	100	100	57	157	45	202	117	319	150	469
(Average Attendance)	6,920	.....	11,920	.....	20,328	.....	36,387	.....	83,415	.....
Community Houses	2	2	5	7	17	24	77	101	105	206
No. of Phonographs	.....	.....	.....	.....	15	15	110	125	132	257
No. Billiard-Pool Tables	.....	.....	.....	.....	.....	.....	95	95	85	180
No. of Bowling Alleys	2	2	.....	2	.....	2	80	82	55	137
Y. M. C. A.'s	.....	.....	2	2	5	7	10	17	22	39
Y. W. C. A.'s	.....	.....	.....	.....	5	5	17	22	2	24
Hospitals	.....	.....	.....	.....	15	15	27	42	22	64
Nursery or Kindergartens	.....	.....	.....	.....	12	12	60	72	52	124
(Average Attendance)	100	.....	137	.....	225	.....	1,130	.....	1,722	.....
Nurses' or Teachers Homes	.....	.....	.....	.....	2	2	75	77	57	134
Laundries	.....	.....	2	2	.....	2	32	34	42	76
Dairy (No. of Head of Cattle)	.....	.....	.....	.....	50	50	837	887	2,200	3,087
Green Houses	.....	.....	.....	.....	2	2	15	17	17	34
Men's and Women's Board'g Houses	22	22	17	39	77	116	117	233	172	405
Ice Plants (No. and Capacity—tons)	2—8	2—8	5—20	7-28	7-40	14-68	32-167	46-235	45-270	91-505
Swimming Pools	.....	.....	.....	.....	10	10	40	50	57	107
Oil Storage Tanks	115	115	45	160	305	465	512	967	835	1,802
Oil Pumps	97	97	57	154	252	406	427	833	830	1,663
Scales, Plain	590	590	260	1,150	485	1,635	460	2,095	730	2,825
Scales, Automatic	25	25	7	32	112	144	440	584	847	1,431
Shower Baths	.....	.....	7	7	130	137	650	787	1,385	2,172
Street Lighting Fixtures	257	257	1,137	1,394	2,367	3,761	5,555	9,316	6,682	15,998
Hand Trucks	827	827	792	1,619	805	2,424	1,005	3,429	1,320	4,749
Elevating Trucks	12	19	7	19	20	39	85	124	125	249

startling contradiction to the idea that the southern mill villages are in the least bleak dreary places of abode.

The houses in these villages are usually of frame construction, though recent years have seen the introduction of complete new villages made of hollow tile and stucco, and even concrete. However, the generally mild climatic conditions in this section make the frame house amply suitable to all requirements, with a reduction in investment charges.

Just what the prevalence of the mill village in the South means does not begin to be recognized until figures of actual construction are obtainable. During the first five years of our quarter-century nearly twenty thousand houses were reported—almost as many dwellings as are found in the entire city of Nashville, and considerably more than are in Savannah. The rate of construction decreased to 8,532 for the years 1909 to 1913, but doubled in the next five years. The last five years saw 24,705 additional houses. For the twenty-five years under consideration nearly 81,000 new houses were built in southern mill villages. This is more, by 4,000, than enough to house the city of New Orleans; more than twice as many as in the city of Atlanta; nearly twice as many as in the entire state of Delaware; and more than in either the District of Columbia or in the whole state of Vermont!

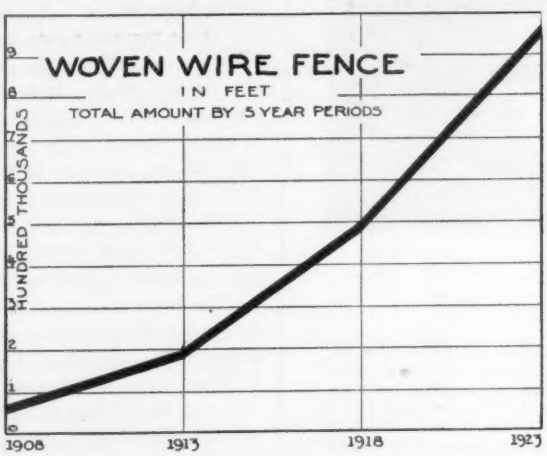
As to the conveniences with which these houses are equipped, a reference to the survey will show that over 54,000 have running water, nearly 12,000 baths, 37,064 with toilets, and 68,318 with electric lights. If the number of these types of fixtures is observed for the last five years it will be noted that more houses were thus equipped than were actually built in that time, indicating that the older villages and houses are constantly and rapidly being revamped and modernized.

That the moral and educational side of these communities is a matter of real consideration is indicated in the construction of 666 new churches, only partly at the expense of the mill owner, the operatives themselves being not only

The community house of the New England Southern Mills at Hogansville, Georgia. Over two hundred community houses exist, silent testimony to a spirit of real helpfulness in providing a field for self-development and social growth.

the churchgoers, but the church contributing builders. Nearly 500 new school houses were built, with the startling growth in *average* attendance from less than 7,000 in the first five years to 83,415 for the last five years. In addition to theses, there are 124 kindergartens with 1,722 average attendance. These figures are a blow to the illiteracy claims made by many criticizers of the southern mill village system, and show by their mere numbers the existence of a spirit of consideration for the children of mill operatives that is in direct conflict with the once popular but now discredited belief that the southern mill owner is engaged in the exploitation of these young citizens.

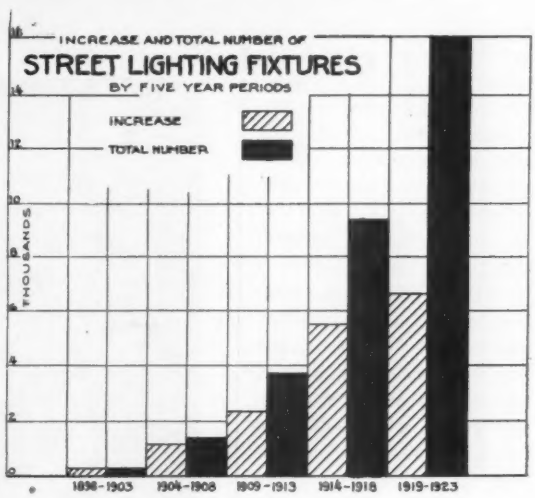
Over two hundred community houses exist, silent testi mony to a spirit of real helpfulness in providing a field for self-development and social growth. There are 134 teachers' homes, 39 Y. M. C. A.'s, 24 Y. W. C. A. buildings, 34



greenhouses, 107 swimming pools. There is other entertainment equipment—exclusive of a large investment in playground equipment—of 137 bowling alleys, 180 pool tables, and 257 phonographs. Summer comfort and health have had consideration in the erection of nearly a hundred individual ice plants, with a total capacity in excess of 500 tons of ice a day.

There is a melody in the hum of spindles, even when sunk in the ceaseless clack of looms. But who would expect to find the materialistic, money-searching atmosphere of production leavened with deliberately created music?

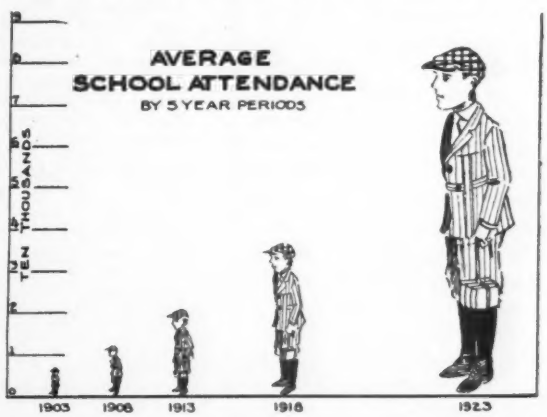
There have been nearly 500 pianos placed in mill villages and sixty-four organs. One of the latter has been



observed in a moving picture auditorium of a mill community house—and this *organ* cost six thousand dollars!

The seven bands and orchestras of twenty-five years ago, averaging over twenty instruments each, have grown apace to 171 with 4,345 pieces. These bands are universally under trained instruction, and composed entirely of operatives and their children—men, girls and boys! Evening concerts, afternoon concerts, Sunday music—a genuine contribution to morale.

Southern villages are now generally equipped with good streets and roads, electric lights, trees, and frequently



The Village of the Massachusetts Cotton Mills Among the Lindale, Georgia, Hills.

shrubbery and parkway grass. In the last fifteen years, nearly two million feet of concrete sidewalks, and almost a half million feet of concrete pavement were laid —that access to the homes of the operatives might be made easier for their occupants.

Nor has definite progress been absent in the field of management. Within the last few years the possibilities of training the executive forces within the mill itself have found expression in foremanship training classes in easily a hundred southern mills. Here the most indefinite of intangible factors is put on a solid basis of proven experience in the discussion of problems in relation to labor turnover, cooperation, leadership, employment policies, training of new employees, accident and waste prevention, thrift, health and sanitation, etc.

A broader movement, more far reaching in its effect, are the periodic discussions held among the 1,200 superintendent and overseer members of the Southern Textile Association. Taking one department of cotton manufacture at a time, each mill superintendent, is accompanied by his department overseer, and kinks, problems, new processes, and better methods are discussed in an effort to get a group opinion as to the best in practice. For sheer openmindedness, the spectacle of the absolute extinction of the one-time secret-process-hording instinct in these meetings is inspiring. Individuals, mills, and even given groups may each alone drop by the wayside of neglected growth—who can oppose, even in the thought, the inevitable progress of a whole interworking, the-other-fellow-boosting gang like this?

These are figures, all, of accomplishment—of physical growth on the one hand, and of vision and belief in the future on the other. It takes their mass effect to bring us to a realization of their hugeness—of our presence in the midst of a single type of industrial growth, progress and development that swamps us in its ungrasped immensity.

The South is now not only in strides of accomplishment industrially, but has been building consistently toward that end for the last full generation—building not only with brick and timber and mortar and metal, but with an unsung intelligence that has kept much of it apace and in step with the last word in modern scientific, technical and moral advancement.

To the future, with its battles ahead, our immediate past bids us look forward with—not smug satisfaction in accomplishment—but the assurance of our ability to more than hold our own!

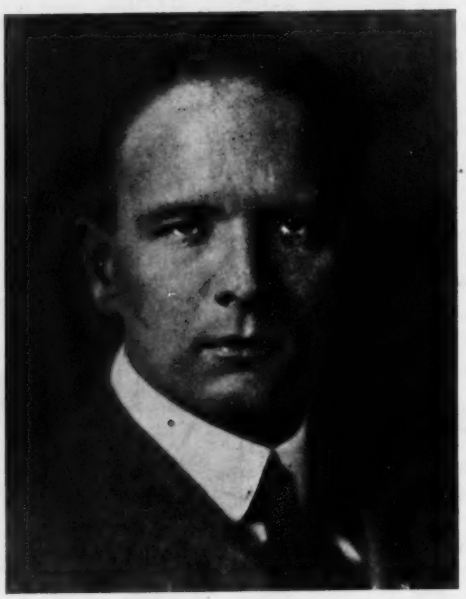


Photo by Bachrach.

Broadus Mitchell Ph.D.

Dr. Mitchell, the author of the article beginning on page 195, was born at Georgetown, Kentucky, in 1892. After attending preparatory schools in Richmond, Virginia, and Providence, Rhode Island, he entered the University of South Carolina and received the A.B. degree in 1913, having done some reportorial work, during his college course, on the Columbia Daily Record. He joined the staff of the Evening Journal, Richmond, and later was special writer for The News Leader in the same city. He entered the Johns Hopkins University in the fall of 1914 for graduate work in Political Economy, Political Science and History, and received the Ph.D. degree in 1918. Going into the army, he served as private and sergeant in the personnel division in camps in New Jersey, Ohio and Maryland. Upon discharge, he returned to The Johns Hopkins University as a member of the teaching staff, and is now Associate in Political Economy. He has written "The Rise of Cotton Mills in the South," and several articles dealing with economic development of the Southern States.

The Cotton Mills in Southern Civilization

By Broadus Mitchell Ph.D.
The Johns Hopkins University
Baltimore, Maryland

This article is to point out the contribution of the cotton mills of the South in human values, the ways in which the industry has raised the standard of living of those who work in the factories. It is not required to glorify the managements for what has been done, for the reason that so great a development as that of textile manufactures in the section is sufficiently possessed of self-respect and sufficiently led by honest motives to make such praise unbecoming. The aim is simply to explain a social achievement.

In order to account for results it is necessary to use the historical method. This story will be read chiefly by cotton mill men, many of whom are familiar with the progress of events, and others of whom are apt to find a recital of old happenings wearying. The writer makes no apology for running the risk of boring either of these groups. An exhibit of the present complexion of the cotton mill village, no matter how detailed, is without meaning unless the setting is made clear; if the background is painted in faithfully, the foreground has so much the greater distinctness.

As in any momentous social change, the advance of the South from slavery and agriculture toward manufactures with free labor has brought its deplorable consequences. There have been negative elements in the calculus, and, too, absolutely hurtful practices backed by justifications sometimes ignorant and sometimes vicious. While special pleading cannot extenuate these, the compelling forward push of progress crowds them out and assigns them ultimately to the account of profit and loss.

In this belief the writer's purpose is to dwell upon positive accomplishments, without referring debit or credit to personalities, and seeking to count the net social gain. As a native Southerner, an honestly admiring student of its growing greatness, and one devoted to its interests, he wishes to be above all else helpful.

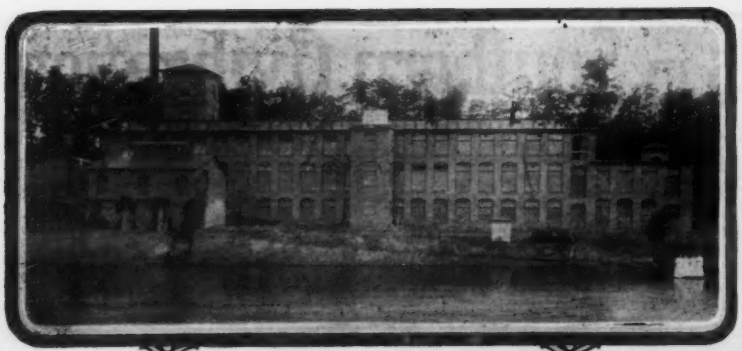
The human phase in the development of the cotton manufacturing industry in the Southern States stands out more importantly than any other. This is in spite of the fact that other features of the inception and advance of the mills have commanded the world's attention. In sixty years the South has gone far toward accomplishing an economic reformation. If at the outset the section could have foreseen all of the thousand directions in which prodigious enterprise must be put forward to achieve its task, it would perhaps have faltered in its purpose. As it happened, the immediate project was pressing, and men went blithely to work, meaning to utilize every opportunity that offered, and making opportunity where chance was unfavorable. The very fact of the attempt in large sense brought solution of the confronting problem—economic muscles strengthened with use.

After the civil war and Reconstruction years, those in the South who had social imagination resolved to forget the hindrances of the past, and invited a new day. They began to make an industrial revolution. From whole absorption in agriculture, they focused the public mind on manufactures. In the midst of poverty, there was a will that found the way to capital investment in cotton mills. Few had had experience of the engineering problems involved, but factories sprang up and were equipped with the best machinery. With little initial knowledge of the relative advantages of water and steam power, judgment matured rapidly. Men who had never marketed anything but cotton, and that through routine channels, learned how to realize on manufactured goods. Planters who had drifted in the easy flow of agricultural existence discovered how to organize industrial undertakings, and fought upstream against competition.

But the change from the enslaved black hand guiding the plow to the free white hand assisting the spindle was the most novel of all the features of this new departure. The technical problems were difficult enough. The "poor whites" who entered the first mills had no industrial background. They had never seen frame or loom or speeder. Every process was awkward to them. Continuous hours of close attention to machinery contrasted with the variety and simplicity of old familiar habit in the country. They were not accustomed to coordination of effort, or to receiving directions. However, enveloping such perplexities were greater ones. In the main, the South's work had not been done for wages. Help had not been employed, but owned. The mills meant the arrival of the "cash nexus" with all its complications in store. The old economic controls of master over servant were relaxed, and a new way of joining the brains of management to the muscles of operatives had to be comprehended.

Further, the owners of factories and the workers in them had not been in partnership before. The South's labor system had made them economic enemies. Every cir-

A general view of the mill village; Fairfax Mills, Fairfax, Alabama.

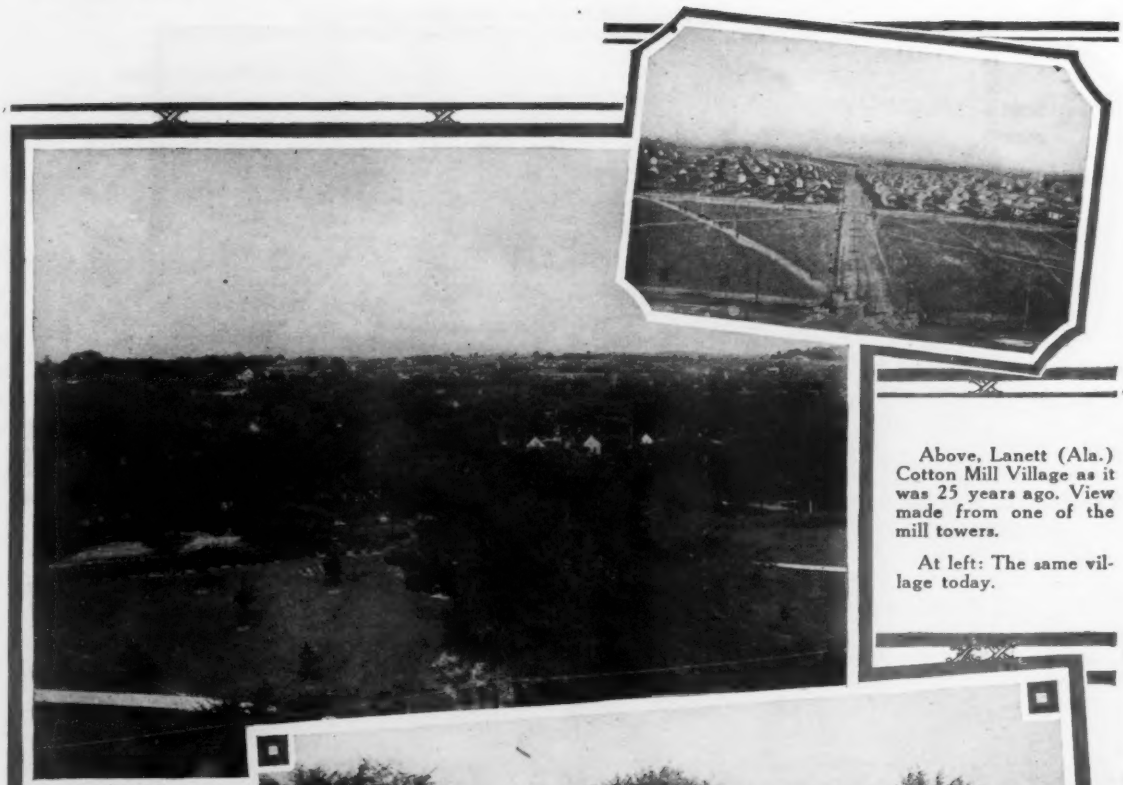


Imperial Cotton Mills, Eatonton, Ga., in 1900 and today. Organized in 1900 with 5600 spindles and 160 looms. Present equipment 13,712 spindles and 328 looms.

cumstance of the struggle for a living had been calculated to alienate them. The section held to the doctrine that it was cheaper to buy a man and maintain him than to hire a man and pay him. Those not offering to be purchased and not able to purchase others, were left out of the scheme of things. The plantation slaves pushed the poorer whites out of economic participation. Had they possessed the means, most of them might have emigrated and left no great gap behind them. Remaining of necessity, they made places for themselves on the fringe of civilization and in most respects were just tolerated.

Slavery forbade the opening of opportunities to the unpropertied whites. Slave labor must be employed in simple operations, where gangs could be worked with small supervision of individuals, and in which the tasks, however hard, were slow and required strength and endurance rather than adaptability and intelligence. Thus enterprise expanded itself in agriculture, and money sought investment nowhere else. The South believed dogmatically in the principle of the territorial division of labor—what a section fancies it can do best, let it do exclusively. Cotton was King, and interest in other activities than its cultivation was minor. Manufacturing, mining, and shipbuilding stood at a minimum. Fabricated goods came from the North and from Europe. The simplest appurtenances of agriculture itself were purchased from a great distance. Able to buy from others, the South did not trouble to make for herself, and took distinct pride in being a society of landed gentlemen despising "truck and barter." Few cities grew, and fewer sprang up. Life was lived too largely in splendid isolation on planters' estates. If there was social intercourse, it was because gentle folk had much leisure to devise means of seeing each other, if, indeed, they were not absentee landlords enjoying winter seats in the capitals.

All this meant that the poor whites not only had no place provided for them by those in social control, but could not make room for themselves in any fashion to give them a future. If little mills and forges existed here and there, they were often worked by slaves. Industrial communities hold out many chances of a living to tradesmen, common laborers, mechanics and small neighboring farmers. In the absence of these, there were few to constitute a middle class. Gentlemen planters were often their own merchants and brokers, while many functions now performed by business men then belonged to the profession of the law; lawyers consummated land deals and acted as trustees and investment bankers. Artisans were frowned upon, for these did not fit into the South's "peculiar institution," refusing to buy slaves and demanding respect for free labor.



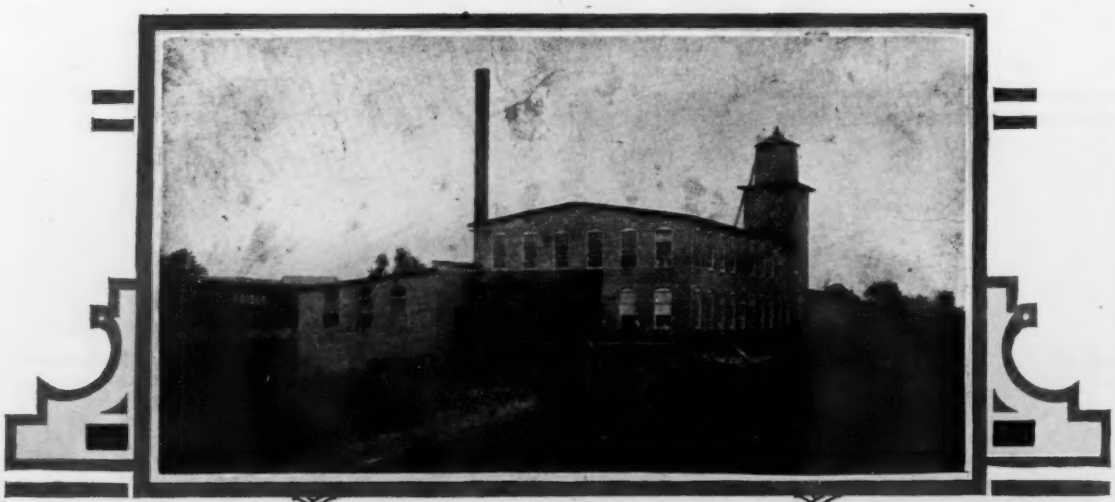
Above, Lanett (Ala.) Cotton Mill Village as it was 25 years ago. View made from one of the mill towers.

At left: The same village today.

At Right, Operatives' Houses in the Front Row of the Village shown above. Photo made from Park in foreground.

The poor whites must live, then, on the land. The South believed in the cultivation of staple crops—cotton, rice, tobacco, and sugar. The plantation regime must be as nearly as possible automatic. Experiments in farming were not popular and not profitable. The negroes, at best substituting mere duty for ambition and obedience for understanding, were not original workmen themselves, and enslaved the mind of the master. He became as unperceiving as they, and the masters being the only part of the population that counted, the whole South was cast into bondage. The section went on making more and more cotton, exploiting itself blindly and making sterile its own social inventiveness as persistently as it killed the fertility of its soils. Finally, habit became principle, and an unlucky agricultural twist was erected into a total political and economic creed.

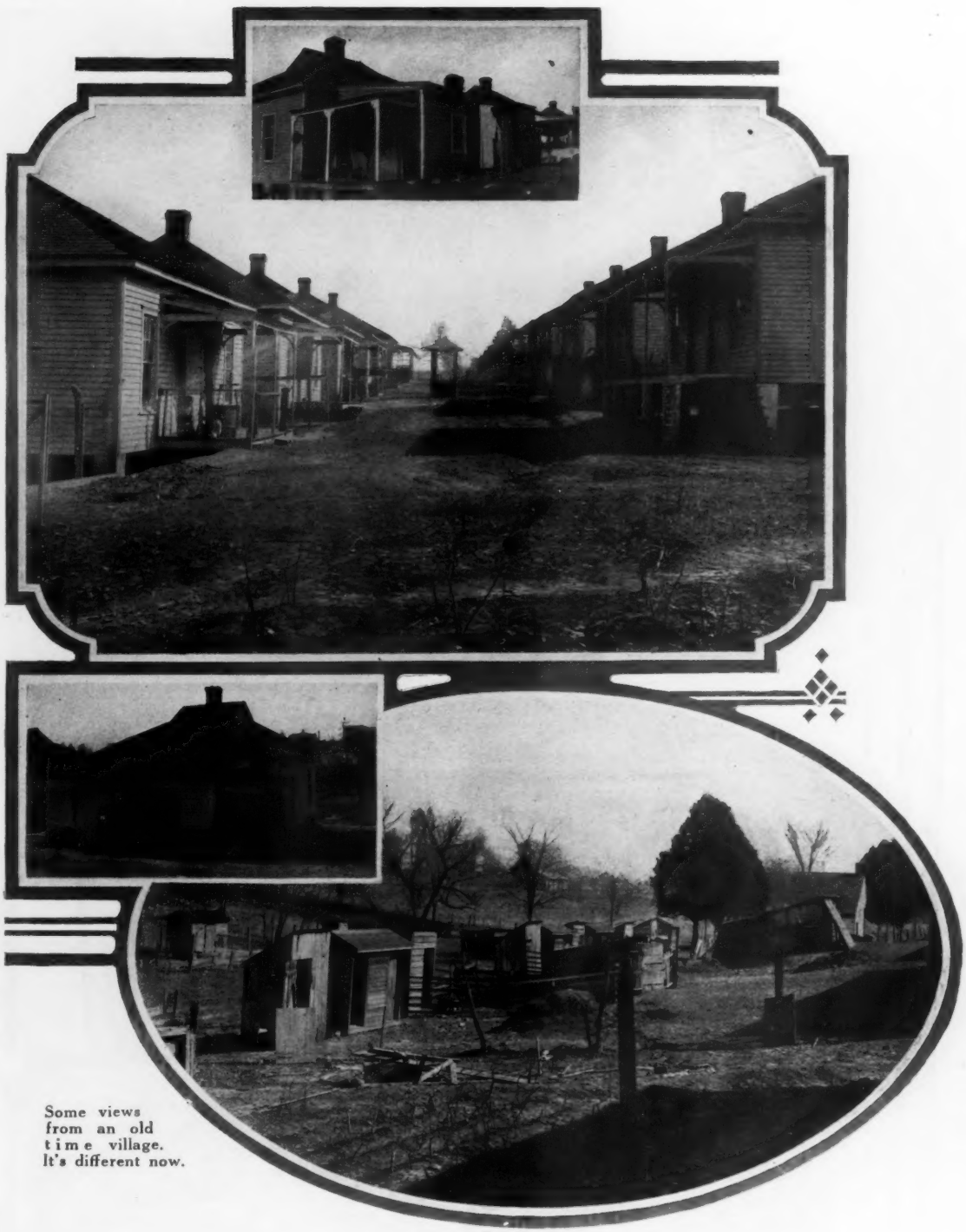
The whole credit mechanism was founded on cotton cultivation. Farmers who needed to have store goods and equipment advanced to them had to raise cotton if they wanted to be trusted. It was the sure money crop. Thus for the poor whites life on the land must be somehow in the service of cotton if they chose to remain in the districts where the staple grew. A few of them could work as overseers, but the rest must be tenants on mean conditions. Some barren land there was in the low hills between coastal plain and fall river line, and here many clung



The top picture shows the mill, organized as a knitting mill by The Whittaker Mill Company, Blacksburg, S. C. Later this mill was changed into a sheeting mill under the name of the Broad River Mill. It now has 14,000 spindles and 324 looms and its general appearance is seen in the lower picture. The old mill, with its square tower, may be noted just back of the newer building.

on as squatters. The poor whites who were not meager retainers of the plantation masters lived in the farther uplands. Here, to be sure, there was not the competition of the slave on every hand, but the soil did not lend itself to cultivation readily, and produce must be carried to distant markets over intolerably bad roads. The mountaineers held desperately to such of the free traditions implanted by German and Scotch-Irish forbears as had not been obliterated by the slave system of the country, but a sensitive personal pride living on in the face of reducing poverty was all that was left.

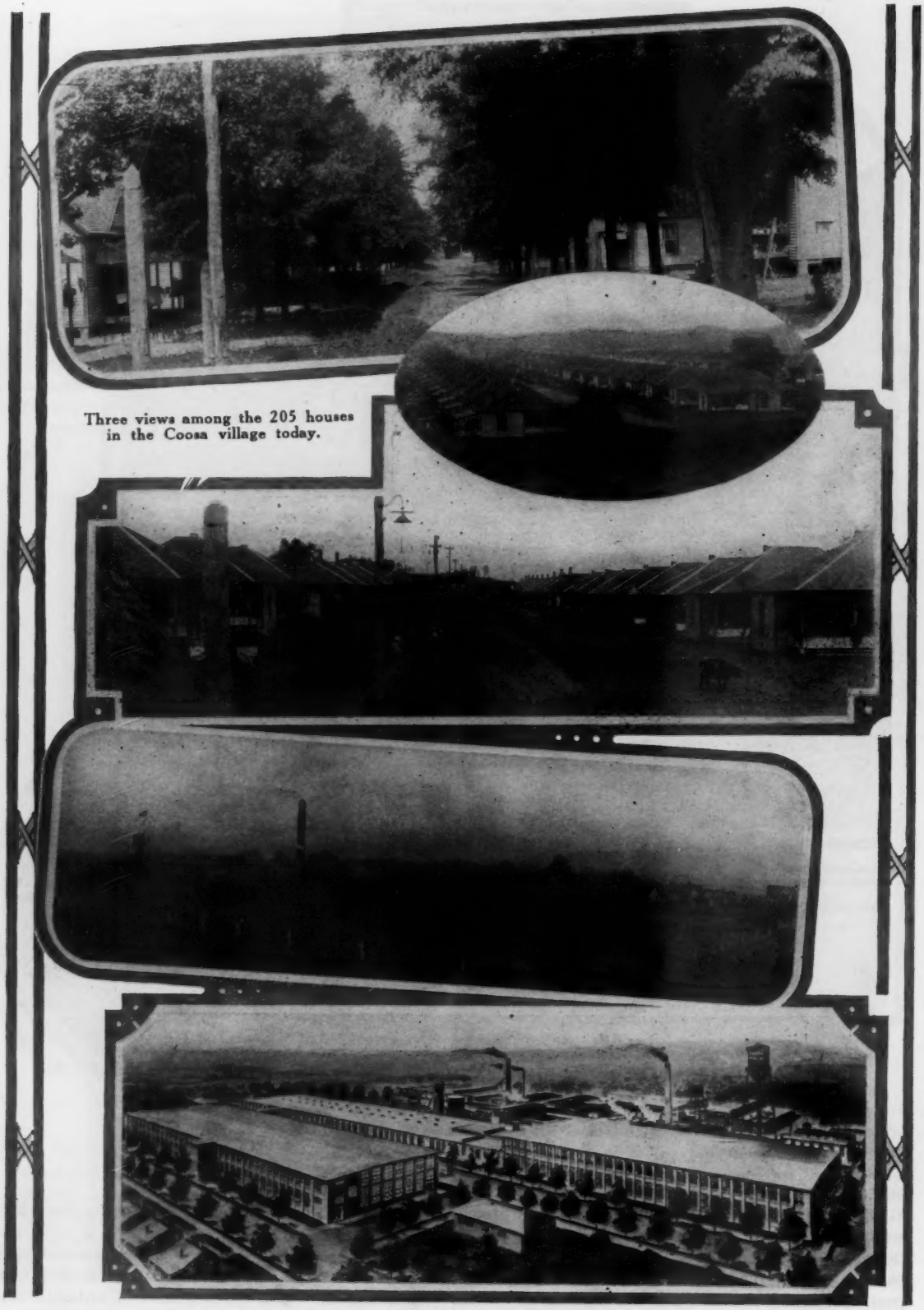
Walter Page knew the poor white, and called him "the forgotten man." He was dispossessed. Such public educa-



Some views from an old time village. It's different now.

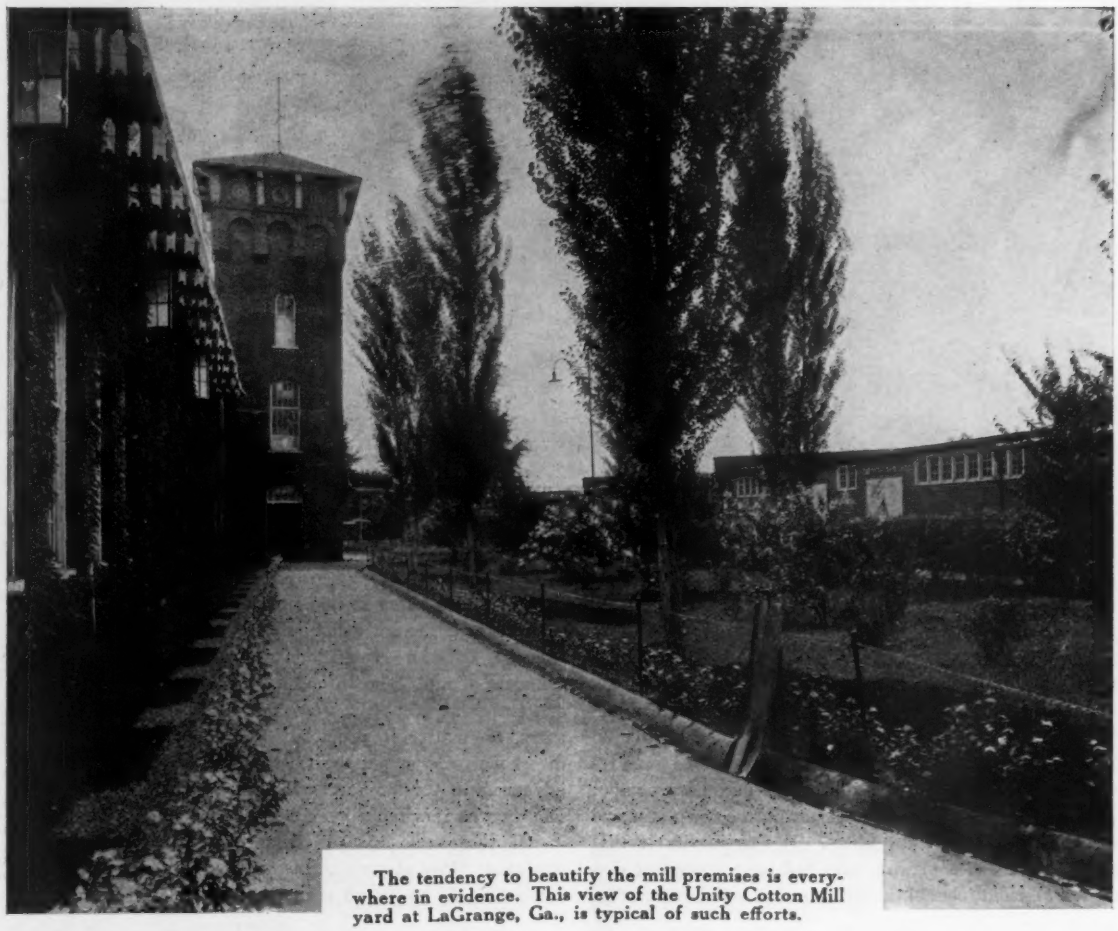
tion as existed was charity, and very insufficient charity at that. The only teachers of the poor whites were preachers and politicians, and these played equally upon the emotions with equally hurtful results. The church could offer only patient piety under affliction, and the politician dispensed civic quackery. Because of economic displacement the poor white hated the negro and, always ready to respond to any call of race prejudice, voted with the planter, though the economic interests of the two parties of white men were as separate as the poles.

Frederick Law Olmstead went through the South in the decade before the civil war, and saw it as it was. Little that was good or bad escaped him. He summed up his observation of Virginians in words that applied to the whole section: "It is the old, fettered, barbarian labor-system, in connection with which they have been brought up, against which all their enterprise must struggle, and with the chains of which all their ambition must be bound.



Three views among the 205 houses in the Coosa village today.

The bottom picture shows a sky view of the Coosa Plant of the Standard-Coosa-Thatcher Co., at Piedmont, Ala. The picture next above shows the same property in 1898 with its village of six houses at the right.



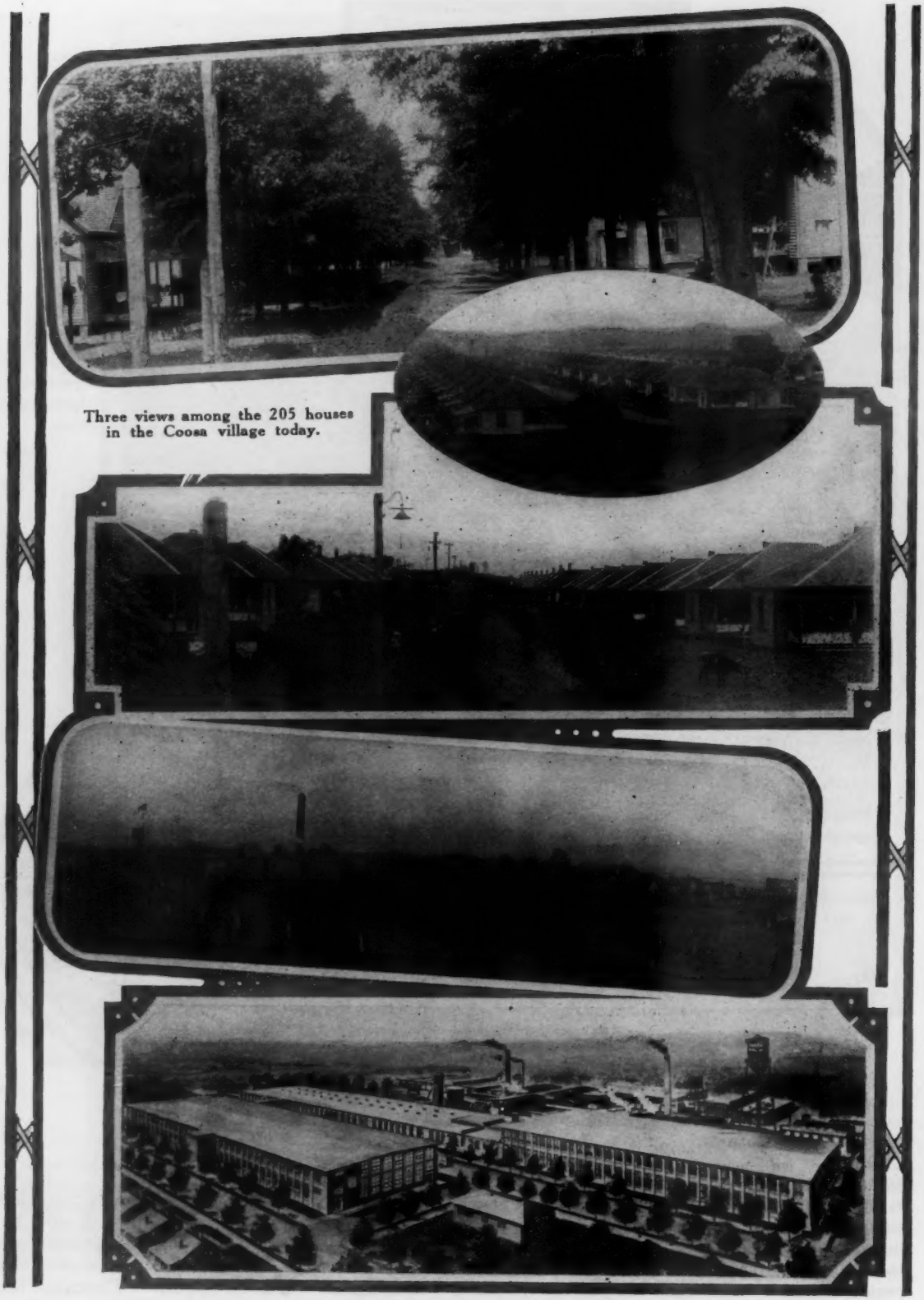
The tendency to beautify the mill premises is everywhere in evidence. This view of the Unity Cotton Mill yard at LaGrange, Ga., is typical of such efforts.

This conviction . . . is forced upon one more strongly than it is possible to make you comprehend by a mere statement of isolated facts. You could as well convey an idea of the effect of mist on a landscape, by enumerating the number of particles of vapor that obscure it." The poor whites were bondmen beyond everyone else in the South, for the masters, however cramped their outlook, were at least in possession, and the slaves, however little their liberty, were at least secure. The unpropertied whites had no place in the community.

Nor did the civil war and emancipation of the slaves help matters for the outcasts. They came back from serving the South in the armies to find that there was no more place for them to serve at home than before. The negro had been freed politically, as the North supposed, but he was economically as much a slave as ever—as dependent upon the white man of property and position. In the main he did his old work, and thrust the poor white aside as he had always done. The stricken condition of the section rendered chronic misfortune doubly galling. Here and there, it is true, in the breakup of a plantation some one of the tenant class entered upon the purchase of land, and through reconstruction years every white vote was rallied against the Carpet Bagger and his black following, which somewhat increased all the whites' understanding of each other.

For the fifteen years following the war all was political hatred, economic confusion, sectional animosity and human hopelessness. But finally, about 1880, the South turned over a new leaf. The section forgot old tenets and formed a new faith. This was that the South must cease thinking of herself as peculiar in economic as well as in political character, and must follow those pursuits which the rest of the country found profitable. The cry was: "Bring the cotton mill to the cotton field!" Cities which had previously forbidden the use of the steam engine within their limits, little towns which had been stagnant and despondent, and even country neighborhoods took up the shout and rapidly made plans for manufacturing the staple. Any man of leadership or promising business connections might be forced to the front. Planters, merchants, doctors, teachers, lawyers, and even preachers headed factory enterprises. The last patriotic dollar that the local community or the people of the State at large could muster was summoned to set the project going, and intending southern manufacturers posted north to enlist the monetary aid and industrial experience of commission houses and machinery makers.

One of the chief reasons for building cotton mills was the purpose of their projectors to furnish employment to the poor whites. One is tempted to believe profits a greater incentive than philanthropy. However that may be in general, the South was in strange circumstance, and novel motives in business showed themselves. Full explanation lies in many facts, but the chief is that the people still looked to the old leaders for help and direction, and these exslaveholders and ex-Confederate officers simply played familiar



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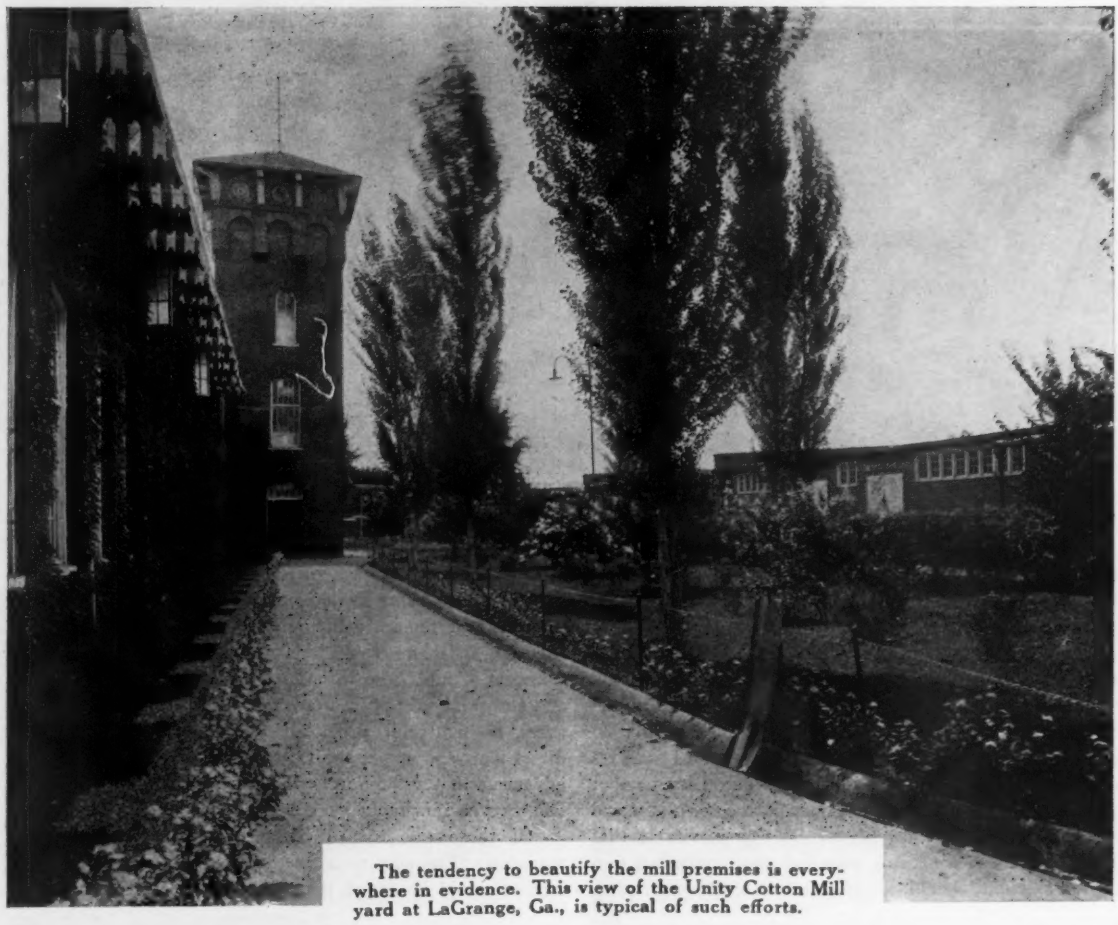

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A Commodious Scout Cabin on Lake Louise for the Scouts of Mignon, Ala.

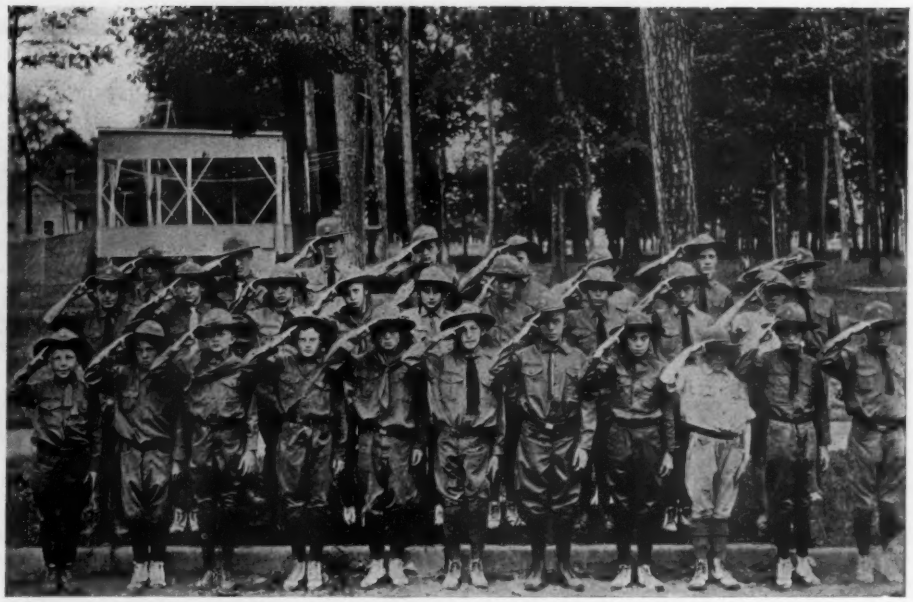
It is not better for these children to "hunt wildcats and grow up moonshiners than to be set physically and mentally right and afterwards make yarn and cloth."

roles under unfamiliar conditions. It is true that the new manufactures would draw money into the South and put it in circulation, thus quickening business in every department, but really nothing can alter the fact that scores of men built factories as much from altruism as from any other cause. No one can understand the history of the southern mill operative or appreciate the significance of his present position in relation to his employer and the public life unless realizing that the old South was metamorphosed into the new. In the Middle Ages, the landlord was responsible for all the interests of the people on his manor; in the same way the master craftsman in the town assumed responsibility for his apprentices. It was inevitable that the southern man of affairs, who had once controlled destinies as of right, should, flung into a new situation, offer to do so as a matter of duty. It is impossible to change an ingrained social habit overnight, and, happily, it is equally unwise to do so. A principal point about the South's industrial awakening in the 'eighties is that she accomplished it herself, though enlisting, it is true, the quick assistance of outsiders commercially interested. Even those founders of mills who wished to take advantage of a ready and cheap labor supply, were conscious that industrial progress, no matter if promoted with money-making as the direct motive, was yet the most wholesome school of social advancement for the South; they knew that their very selfishness was inevitably generous.

Of those who turned philanthropist-manufacturers it was said: "Probably no better field for the exercise of such motives could be found than among the large planters of

The Cafeteria and Nurses Home at the Shawmut Mill of the West Point Mfg. Co.

Light, clean, healthful, and sanitary, surrounded by foliage, is it any wonder that many workers patronize this cozy homelike place instead of eating a cold lunch in the mill?



Boy Scouts from Mignon, Ala., off for a week at Camp Andrews. There are four Scout Troops at Mignon. All these boys live by the Scout oath which is, "On my honor I will do my best to do my duty to God and my country, to obey the Scout laws, to help other people at all times, to keep myself physically strong, mentally awake, and morally straight."

the South. Long accustomed to leadership in all the political, business and social affairs of the community, imbued with a spirit of helpfulness which their control over the . . . earthly destinies of others taught them to exercise during slavery days, taught finally by their own discouragements during the years of reconstruction how bitter is the curse of poverty, these men would not lack . . . the willingness to help their poorer neighbors along the road to . . . industrial independence." And another who knew his own people declared that the spirit inherited from the anti-bellum South "has maintained . . . the old sense of responsibility toward the unprivileged," that it is this "quick sense of social obligation," this "local conscience" which has given "distinction and beauty to the allegiance between the aristocracy and the common people." Anyone who observes the solicitude of southern cotton manufacturers for the welfare of their villages realizes the truth of Mr. Page's remark respecting the people of the section, that "they are not only demonstrative; they really care for one another in the most affectionate ways. Helpfulness is not an act of conscience: it is an impulse."

Nothing that has been done in welfare work in the southern cotton mill villages in the last forty years is new in spirit or in main outline. Robert Owen at New Lanark, Scotland, a century and a quarter ago inaugurated "an institution for the formation of character," a community kitchen, a model school, outdoor games and a band. William Gregg at Graniteville, South Carolina, seventy-five years ago rightly called his village "an asylum for widows and orphans," and considered himself a social missionary.

The motive of human helpfulness is illustrated by the building of the Salisbury Cotton Mills. The town in 1887 had not retrieved the losses the war cost, nor had it tried to do so. An interdenominational protracted meeting was held with the unexpected result that the preacher soon began to advocate a cotton mill as the best means of salvation for the community. It was useless to urge industriousness upon sodden, hopeless people so long as there was no opportunity of employment. The town caught the new religion, and it was a group of ministers and leading church members who projected the new manufacturing enterprise. A population which had been poor and ignorant and lazy soon became thrifty and prosperous, with the consequence that the moral problems of the town solved themselves. The Charleston Manufacturing Company half a decade earlier was commenced with the philanthropic incentive prominent

School House at the Indian Head Mills of Alabama, Cordova, Ala. 10 rooms; 11 teachers; 500 pupils.

in the minds of investors, and Clinton, in the same state, exhibited the same feeling.

The great morality in the South then was to give the poor whites a chance to make a living. Their crying need was to be welcomed back into the economic citizenship of the South. Their history in the mills from 1880 until today has been the progress of that re-entry. Perhaps the way chosen was tortuous, implying the maximum of readjustment on the part of employers as well as workers. Certainly it has involved hardships, and almost two full generations of operatives have, whether knowing it or not, given their lives toward a consummation devoutly to be wished. But it has been the only possible solution. No amount of scheming could have brought the South into social health so long as agriculture was the sole dependence of the people. The institution of slavery had worked a contortion of the body politic which would not yield to religious or political or educational massaging, but which required painful corrective exercises. Manufactures combined with agriculture gave an alternate employment, brought money into the section through the sale of finished product, raised the price of cotton in local markets, increased land values, bettered roads, diverted attention from the eternal question of the negro and discredited the politics which lived only upon this issue, and, altogether, swept the South nearer to main national currents of thought and action.

In the first mills hours were long, pay was little, and a large proportion of children was employed. Almost twenty-five per cent of the operatives in southern mills in 1880 were children, as compared with half this percentage in the mills of New England. This was not a hardship, but a boon. There was no complaint of exploitation. Masters were as hard pressed as men, and all struggled to hold on to the means of livelihood. Of these years it has been said: "There was no thought . . . with regard to who should work or how many hours they should work. The problem was not one of seeking or creating wealth; it was essentially one of employment, of human welfare in the sense of providing instrumentalities by the use of which men, women and children could earn . . . . The exigent demand for the bare necessaries of life, which could be gotten in the cotton mills of that period only by the combined toil of the whole family, overshadowed all other consideration. Literally it was a question of 'bread and meat,' and the mills provided for thousands who could not otherwise subsist."

When it was known that a factory was to be erected, mountaineers and poor tenants began to enquire eagerly for employment, and to make plans for moving their families to the new village. When the mill was placed in operation others came in ready scores. One is reminded of the way in which poor men were anxious, in the Middle Ages, to occupy cottages in the shadow of a protecting castle. When times are troubled, whatever the period of history, the weak become attached to those with greater strength. The mills provided everything, for they built industrial communities in open cotton fields, or cleared away forests to secure places by water-power. Homes, stores, schools, churches—all were the gifts of the management, for there was no other to give.

It is not hard to picture the life of the poor whites before they came to the factories. It was simply the reverse in every respect of the life of the planters, who nourished an unnatural culture and acquired unlucky wealth by a false labor system. More eloquent than any spoken account of the poor whites is the telling silence of most of the writing of the period concerning them. They had been left out of the calculation until the doors of cotton mills were opened to them.

Those who have remained on the tenant farms or persisted in the mountain hollows show today a condition not different from that obtaining forty-five years ago. If we contrast those who have been left in the old environments with those who changed their whole habit of life by going to the mill villages, we get the clearest idea of just what has been accomplished.

Just last year a thorough investigation was made of the social status of white tenants in two townships of Chatham, a mid-state county in North Carolina, and the results, making a vivid close-up picture, were published by the State

The School Buildings of the Piedmont Manufacturing Company, Piedmont, South Carolina.

(See illustration on opposite page.)

The first school at this village was a one-room affair with one teacher from 1877 to 1886. Then the building shown in the top picture was erected, as well as a small one on the Anderson County side of the river. There were five teachers and about 175 pupils in all. Three teachers worked in the building shown, the top story being used for lodge meetings. The other two teachers worked in the two-room building on the Anderson County side of the river. Later, more rooms were added to the latter building and from 1890 the work was up to the sixth grade.

In 1920 the school building shown in the lower picture was completed and opened with a teaching force of fourteen and with four in the building on the Anderson County side. In 1923 three more teachers were added, giving a total teaching force for both schools of twenty-one, and a total enrollment of over 700 for the year. Perhaps the best feature about this school is the fact that during the last year the average attendance was 80 per cent of the total enrollment, which is a better showing than has been made in previous years.

It is of interest to note that this school is on the accredited list of schools doing full eleventh grade work and its pupils are entitled to state high school diplomas. The building has 17 class rooms, besides the auditorium, storeroom, superintendent's offices, teachers' rest room, etc. It contains a very complete and fully equipped home economics department with a special teacher for this work, and all high school girls have the benefit of a three-year course in home economics. The school also has a completely equipped science laboratory and it also has a commercial course with the necessary equipment for those who desire to study business practice and theory.

University. Had the survey been made half a century earlier, the findings would have been much the same. This district before the war was a typical seat of slavery. Except for a small cotton mill, there are no villages in the area, the houses being only three to the square mile. "The cash in circulation in the homes of the fifty-one white tenants was only twelve cents a day per person . . . . Here certainly is life reduced to its very lowest terms in money." In the white cropper families, indeed, there was only eight cents daily cash per person. A large part of the little they raise is for consumption then and there; the crops sold for money scarcely count. The stores advance supplies and so do the landlords, and the debts thus incurred eat up most of what salable crops might bring. White cropper families receive on the average only $153 per year in money, and most of this comes at the end of the year. The report declares: "There is too little ready cash in circulation in the country districts of North Carolina and too little accumulated wealth. Until both are multiplied many times over, the twelve hundred thousand farm people of North Carolina are a mired wheel in our civilization."

In these townships the black tenants are actually ahead of the white—the negro cropper families get $197 per year in cash as against $153 for the white. The whites' "standards of living are higher but their levels of life are lower than those of the black farmers alongside whom they live

An Apartment House of Unusual Construction in the Village of the West Point Mfg. Co., at Langdale, Ala.

and work, inevitably so because their average cash income is less—22 per cent less than that of the black croppers, 47 per cent less than that of the black renters, and 74 per cent less than that of the black owners." It is pertinently asked, "Can a civilization forever endure on the basis of political freedom and economic serfdom?"

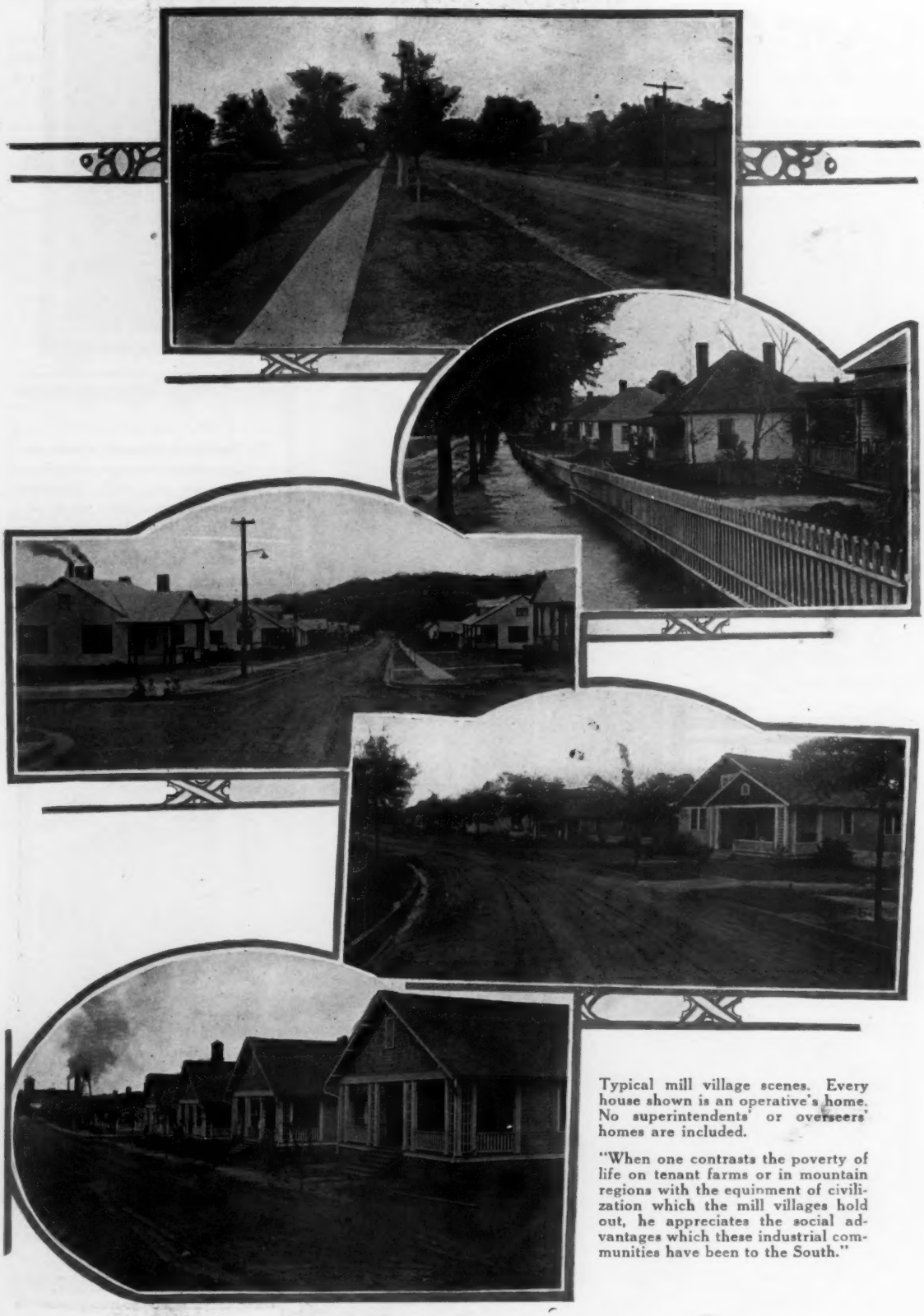
Of the dwellings of the white renters in this district it is reported that "twenty have 203 window lights out and ten have shutters off. In more than half of these dwellings it is possible to study astronomy through the holes in the roof and geology through the cracks in the floor." Such sanitary provisions as exist are negligible or constitute an actual menace in each case. The tenant families paid on an average $48.64 in the year to doctors and druggists. "Nearly one-ninth of the total cash incomes . . . went for illnesses, to say nothing of the funeral expenses when the illness ended in death." In one home the doctor's bill was $400 and the total worldly goods of the tenant $289. "Death is more endurable than sickness in many tenant homes." Forty-seven out of 148 children borne by the mothers in these homes are dead. Not one of the 178 members of these households has ever been vaccinated. Almost no printed literature of the state on health and housekeeping and farming reaches their homes.

Such a community can have few facilities making for fullness of life. It is rightly observed that the opposition of such a population to taxes is the opposition of the collapsed pocket-book. "All the elementary schools in the open country are housed in buildings that are old and weather-stained. None of them have been built within the last twenty years. They are taught for the most part by young girls in their teens. . ." The illiteracy percentage among these tenants is 9.2. "For nearly exactly half of the renter households, school culture may be said to stop on a fifth reader level . . . . For nine-tenths of the cropper families life stops on a fourth reader level." No member of any one of these tenant families ever went to college.

Books and papers and magazines play the smallest possible part in these homes. No families borrow volumes from any school or other public library, and two have no books except the Bible. The scattered churches are the most active centers of community life, and these are broken reeds on which to lean. All but two of the preachers serving the eight churches are non-residents of the locality. Seven of the churches have preaching only once a month. Nearly a third of the white cropper families are "habitually absent from church. No way to go, church too far away, no clothes, they say." Furthermore, they are too proud to go to church when they have nothing to put into the collection box.

Many families had no part in the life of the community, rarely leaving their own rented acres. No family went to a

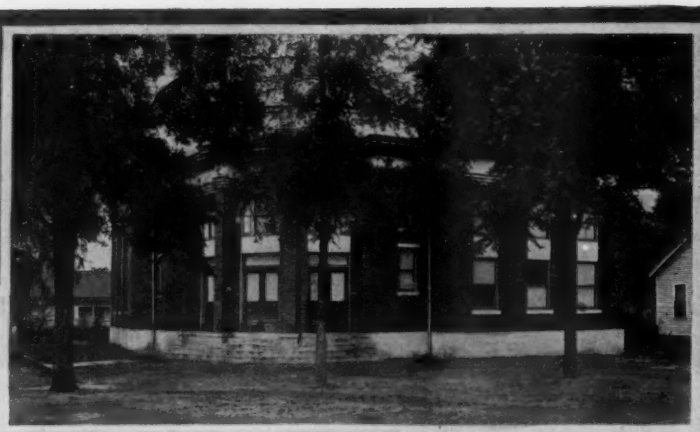
An Apartment House in the Village of the Exposition Cotton Mills, Atlanta, Georgia. This was built to meet the popular demand, induced by a city environment, and is the only apartment in a village of bungalows.



Typical mill village scenes. Every house shown is an operative's home. No superintendents' or overseers' homes are included.

"When one contrasts the poverty of life on tenant farms or in mountain regions with the equipment of civilization which the mill villages hold out, he appreciates the social advantages which these industrial communities have been to the South."

Four churches in the village of the Lanett Cotton Mills, Lanett, Alabama.



The brick church above and the white wooden church at the left are both Christian churches that grew out of the old unpainted structure at the left.

The present M. E. church is the handsome brick building at the right. The inset shows the fore-runner of this church as it looked 25 years ago.

At the left is seen the present Baptist church while the small inset shows its predecessor 25 years ago.

circus and only one to a moving picture show in the year.

It is concluded that few of the white croppers are capable of being helped into farm ownership, and the croppers constitute one-fourth of all the white tenants in this district and in the South. It is believed that only 2,800 of the 32,000 white tenants in North Carolina possess the qualities that would make for success even were the way to land proprietorship opened to them by government grant or otherwise.

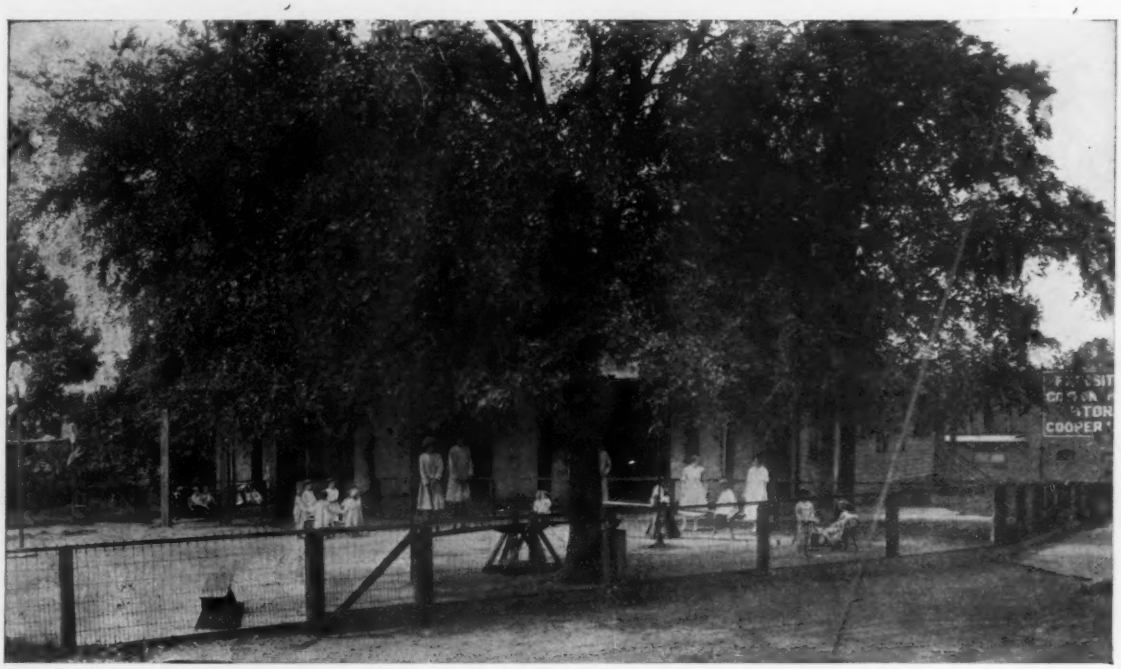
It is stated that more than a third of the people in the townships of Chatham County surveyed have moved out in the course of a generation. It is safe to say that most of these have gone to cotton mill villages. Their lives in their new communities present a contrast to the old state of existence at a minimum.

It must be remembered in viewing the variety of social facilities offered by the mills that most of the textile plants which have risen in the South have involved the building of villages. If the factories have not been located in the open country, the towns near which they were placed possessed no housing room for a sudden influx of population. In most instances the cotton mill communities have been made out of hand. Every department of life of the workers had to be supplied outright or indirectly provided for by the managements.

The best education in the South today is training in the elements of civilization. The whole industrial village is a vastly more important school than the particular building in which classes are held. Programs for rural advancement, promising as these are, cannot be as immediately successful as the influences emanating from an industrial undertaking. In the country families are scattered, and separation makes for ignorance and retards collective action. In the mill towns social work is at close range. Improvement in the standard of life does not depend upon poor acres poorly cultivated; it is not necessary to reform a stubborn agricultural tradition in order to render home and neighborhood environment more grateful. In the mill villages the manufacturing plant (in the industrial history of the South, luckily, almost constantly active) is offering steady work constructively directed and producing regular cash wages. The people have been lifted bodily out of many of their old hindrances, and a minimum of negative work need be expended in order to engage their best capacities.

The chief social agencies in the village are the mill itself, the home, the church (often, in contrast to the country, a

The Sewing, Cutting and Fitting Room at Hylton Hall, Danville, Va. All girls at this Hall are given instruction in dress making under a competent teacher. Hylton Hall is maintained and operated by the Riverside and Dan River Cotton Mills.



Nursery and Kindergarten at the Exposition Cotton Mills, Atlanta, Georgia. A Glimpse of the Cooperative Store is seen at the Extreme Right.

union church), the school, the Christian Association and the welfare department. There are instances in which some of these are absent altogether or are not functioning fully, perhaps because the mill does not have its own village or the plant is a very small one. However, in the textile communities as a whole, welfare work is being more and more widely extended, its ramifications are becoming greater and its methods are maturing. There is no other industry in the United States which directly undertakes so much for the social improvement and well-being of its workers as the cotton manufacturers of the South.

A teacher in a leading mill town has put the matter simply: "The man on the job is the vital factor in our textile industry. Money will buy the most modern machinery, provide the best material equipment, furnish raw material for manufacture, fill the pay envelope; but machinery, equipment, raw material, pay envelopes, while important factors in the product of industry, are reduced to zero if the human factor, the man on the job, is a zero factor. These obvious facts present our obvious need, better . . . help. The . . . question, 'How will we get it?' is answered by the . . . reply, 'Train it'."

It is generally admitted and even declared by southern cotton manufacturers that their village welfare work is maintained because it pays in dollars and cents to have alert, intelligent, healthy operatives who are happy in their homes and get as nearly as possible maximum production from the machines they tend. At the outset of the cotton mill era in the South this was not so true; the motive of kindliness for its own sake operated more largely because the workers needed it more and the far looser competition of those days had not bred up the same commercial responses in the manufacturer which are active now. One who speaks for the industry has compressed the truth into one sentence: "As a matter of fact this whole proposition of social advancement is largely based on business, not philanthropy, although some of the leaders, after years of effort, become so greatly interested in the results they are obtaining that they would deeply resent a statement that their prime motive in undertaking all this work was to prevent labor turnover and thus secure a greater quantity of a better quality of product."

The Unity Cotton Mills Greenhouse, LaGrange, Georgia. Such houses are maintained for the benefit of the community and are used for the storage of tender plants from the homes of the operatives during the winter season and also for the propagation of early seedling plants for the vegetable gardens in the village.

Old and New School Buildings of the Pacolet Manufacturing Co., Pacolet, S. C.

(*See illustration on opposite page.*)

The earliest school work was done in a basement of the old Presbyterian church.

Old Building.

No. Rooms .....4 and Lodge Hall
Date of Use .....Started about 1896
No. Teachers .....3 or 4 at the start
Grades covered .....1 to 10
Average No. pupils .....200 to 300
Note: In 1915 and 1918, two additional buildings of 4 rooms each were built.

New Plant.

No. Rooms .....19 and Auditorium
No. Teachers .....18 including Prin. and Supt.
Grades covered .....1st through 8th
Average attendance .....425 pupils
Approximate cost $125,000
Special Departments:

Domestic Science Laboratory, equipped with 5 student tables and equipment, a range, an oil stove, 2 cabinets well equipped, silverware and china.

Domestic Art Laboratory, equipped with sewing tables, one cutting and demonstration table, 6 machines, one display case, one case of individual lockers, triple mirror, stand, etc., for fitting room.

Gymnasium Department: Outdoor equipment for volley ball, basket ball, baseball and full play-ground fixtures; and an indoor playroom and shower baths for boys and girls.

Manual Training Department: A shop equipped with standard benches and full sets of bench tools, tool cabinets and display cabinet.

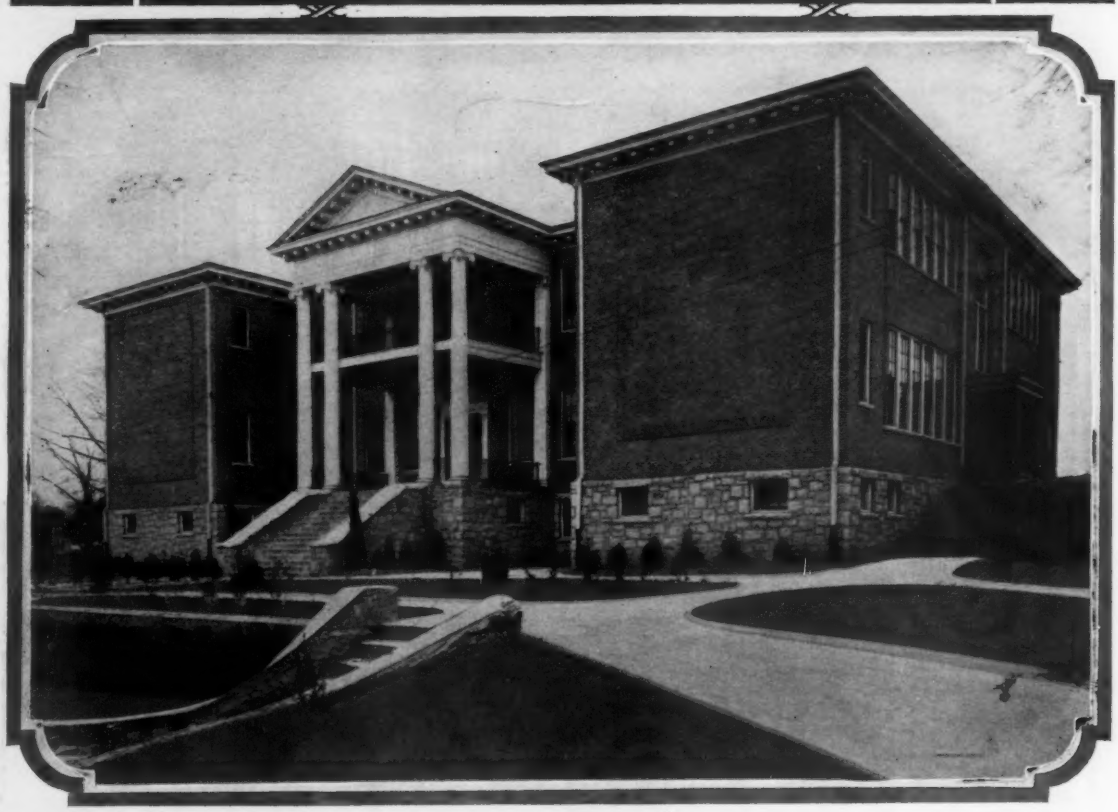
Library, furnished with reading tables, charts and sectional book cases, contains 1,000 volumes.

Part Time Vocational School for children who work one-half day and go to school one-half day.

Evening Vocational School for Adults.

Special attention given to industrial arts and music appreciation in all grades. Also chorus work and singing.

The point should be made that no matter what the stimulus to welfare work in the villages, whether that of business efficiency or of engaging social experimentation, the results in social betterment, so far as 193,000 cotton mill operatives of the South are concerned, stand the same. If managements embrace such a program as a part of their money-making enterprise, it is likely to be pushed so much the more actively. It is true that welfare work was expanded during recent war years partly in the purpose to escape excess profits taxes by including as much as possible under the head of expenses, and partly because competition for workers was keener than before and the more attractive a village the better its chances to secure and hold operatives. But, again, motives do not matter. It is even said by some mill men who are perfectly in the councils of the industry that "manufacturers have frequently, and . . . for the most part, in reality opposed improved conditions. They did not have time to think them out and bother about them, but on general principles they objected to any present expense, or 'by giving sweetmeats to the poor, to teach them wants they never knew before." What-



ever their disinclinations, however, these employers have been dragged along in the procession and have had to live up as best they could to the standard set by progressive companies; otherwise they would have had high turnover in an inefficient labor force.

All the agencies of the mill community may be made to work together for a given end. They are often focused on the children because more teachable. This is fortunate, too, because they will make the next generation very different from the present one. The problem of a hundred and fifty malnourished children in one mill village is a case in point. It was attacked as follows: by teaching all the children of the village in school the cause of malnutrition and the remedies for it; by special classes for malnourished children taught by the community nurse; by visits to the homes and conferences with mothers at which directions were given by doctor and nurse; by the affected children keeping diet cards checked by the nurse; by instruction of the children in the domestic science department of the school in the preparation of prescribed food; by the preachers in their sermons urging care of the body; by the mill providing cow-pastures and stalls, and encouraging the production of milk and butter. The result was that only fourteen of the 150 remained as much as five pounds under weight, and these were hampered by some physical defect which was treated. The superintendent of a large plant

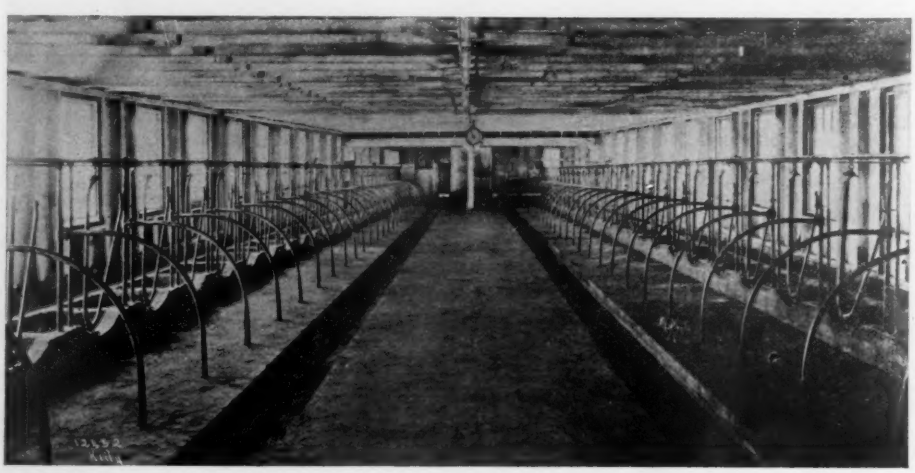
Kindergarten and Day Nursery at the Lanett Cotton Mills, Lanett, Alabama.

A Dairy of the Avondale Mills. Jersey Cows; Federal Inspection twice yearly; 250 gallons daily capacity and being enlarged. This is one of the prime factors in reducing the number of malnourished children in any community. "The superintendent of a large plant said he worried as much about the cow-sheds in the village as about the machinery in the mill."

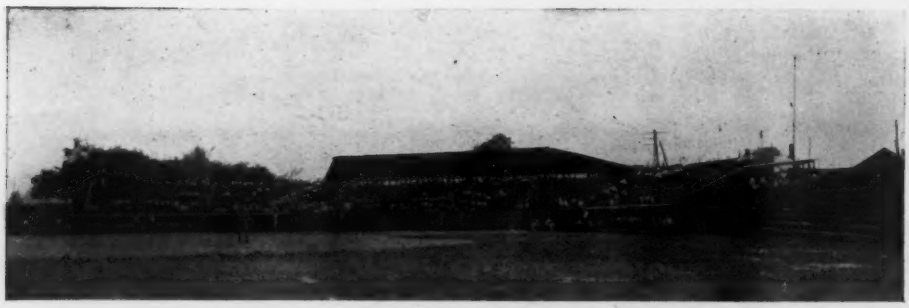
said that he worried as much about the cow-sheds in the village as about the machinery in the mill. Some companies extend financial facilities to their operatives to enable them to own cows, and supply dipping vats the use of which is compulsory.

Schools in villages owned by mills are erected by the companies, salaries of teachers are shared by company and county, and school terms are generally longer and quality of instruction better than in the adjacent districts. Even where the mills circle thriving cities, it is possible for the villages to have made greater relative progress in recent years than the municipality. The formation of a new school district by twelve mill villages and two suburban communities just outside Greenville, South Carolina, is an illustration in this connection. This district has twelve grammar schools, two high schools and a rural school, and is erecting new buildings. There will be a library of some four thousand volumes in addition to the separate school libraries, and books will be distributed by automomible truck, their use thus being rendered inviting.

The progress of individual schools is illustrative. At Pacolet the first teaching was done in the basement of a church. Three or four teachers instructed between 200 and 300 pupils in ten grades. This was in 1896. In 1915 and 1918 eight additional class rooms were provided. Now a new plant costing $125,000 has nineteen rooms and an auditorium, and there are eighteen teachers covering eight grades in which 425 pupils are enrolled. There is a domestic science laboratory where cooking is taught with the aid of the best equipment, and a domestic arts laboratory given to sewing instruction. Besides a complete outdoor playground, there is an indoor playroom with shower baths in connection. There is a manual training department, the library has a thousand volumes, and the building houses a part time vocational school for children working half the day in the mills, and also conducts an evening school for adults. Music appreciation is given in all grades. At Piedmont the first school, in 1877, had one room and one teacher. By 1880 there were five teachers and 175 pupils working in new buildings. By 1890 the grades taught were six. Average attendance was poor. In 1920 a new building was erected at a cost of $100,000, and there are now in



Interior of the Dairy Barn at Mignon, Ala. Every cow knows her stall. And every stall, like every other part of the building, is kept spotlessly clean.



A view of the stands; Lanett Cotton Mills baseball field.

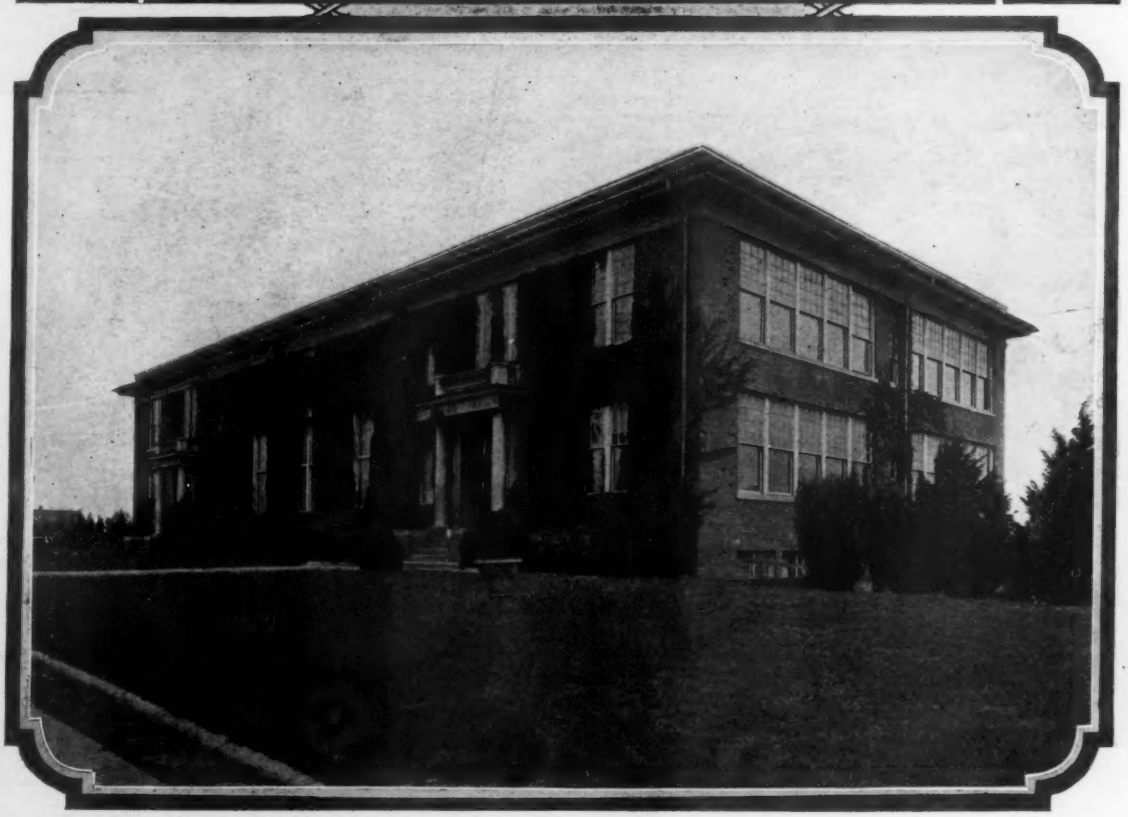
the school twenty-one teachers and over 700 pupils. Average attendance last year was 80 per cent. There is a science laboratory. An increase of thirty students in the high school this year is mainly due to local pupils remaining longer in school.

The mills in some instances have vacation camps for the villagers. All with any pretence of welfare work have athletic grounds and many have gymnasiums and swimming pools. The newer villages are apt to have cottages planned in skillful variety, with winding instead of straight streets, and everywhere vegetable gardens and flower beds are encouraged. Houses rent regularly for twenty-five cents per room per week, and, plastered and equipped with electricity, are ten times better than the homes that most of their occupants came from in the country. Stores in the mill villages sell at reasonable prices and do not allow their patrons to become engulfed in debt by a vicious credit system as is the case in rural districts—the stores are dependent upon the people, not the people upon the stores. Besides the large item of house-rent, wages are to a considerable degree paid in kind, as in free wood, coal at or actually below wholesale prices, free gardens and seeds and pasturage, unpaid attendance by physician, dentist and nurse and welfare facilities generally.

Mr. Frank Tannenbaum in a recent article has quoted Mr. Stuart Cramer to the effect that the southern cotton manufacturer has perhaps one-third of his capital tied up in a village with all its appurtenances, whereas his northern competitor has every dollar of his capital invested in producing equipment. It is declared that the southern mill man would be glad to get rid of his village. As a matter of fact, in the present condition of the South, the mill village is as much a part of the producing machinery of the plant as are the spinning frames and looms themselves. The South enjoys advantages in cotton manufacturing over the North and Middle States which permit heavy investment in villages with profit still accruing, as is evidenced by the coming South of northern textile firms which adopt the local custom. So long, moreover, as workers continue to be drawn fresh from rural districts, without industrial tradition and lacking the habit of community life, the villages are as helpful as they are necessary in bridging an economic gap.

When one contrasts the poverty of life on tenant farms or in mountain regions with the equipment of civilization which the mill villages hold out, he appreciates the social advantages which these industrial communities have been to the South. They constitute a benevolent despotism without doubt, but one must always remember that the South is in transition from a stultifying single pursuit of agriculture to a livening and health-giving fusion of manufactures with farming. If this experiment is to be successful, there must be economic tutelage of the working population which is altering occupations so violently. In Russia the Bolshevists have declared frankly that their autocracy is intended, that there must be strong leaders to assume responsibil-

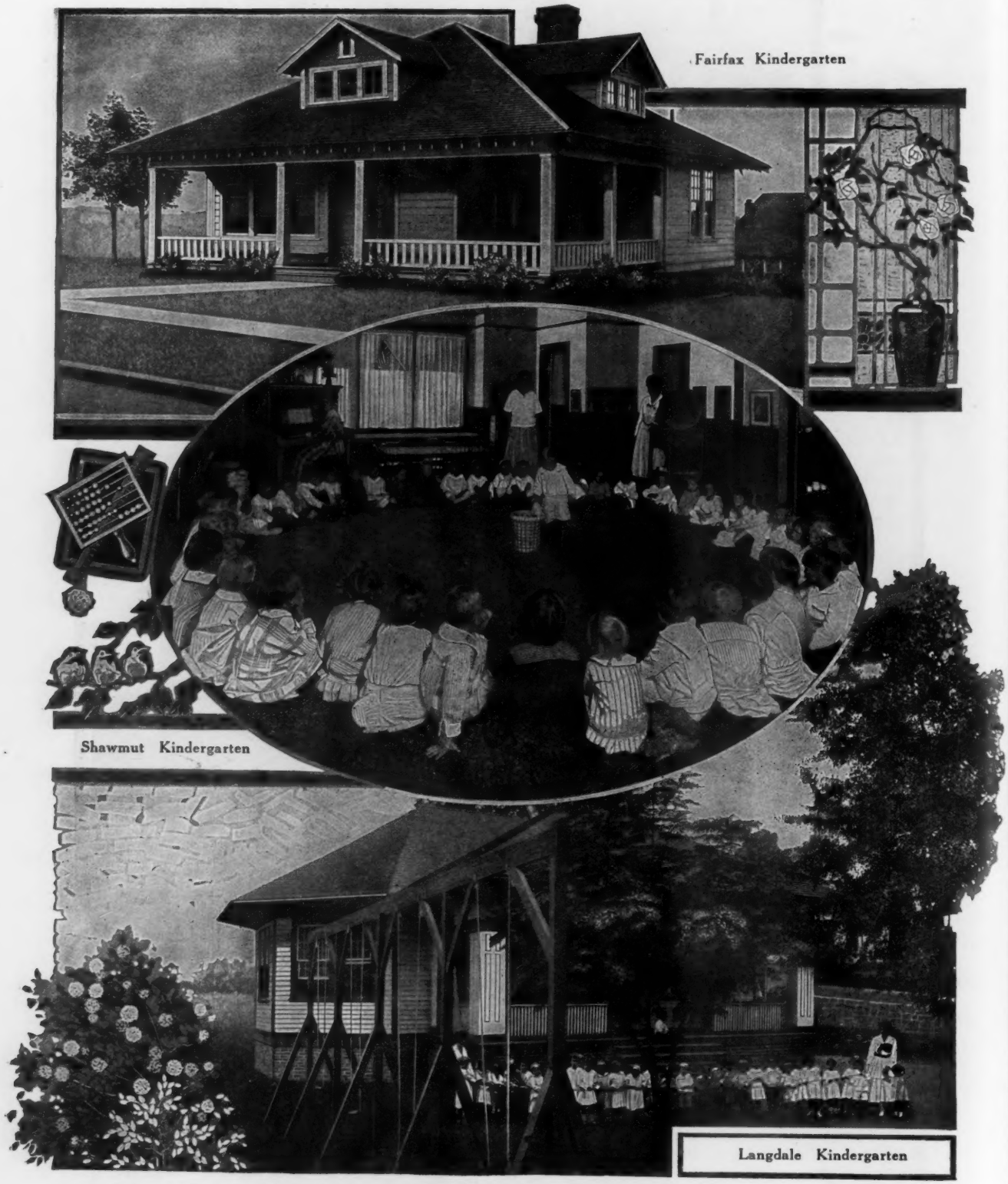
The mill baseball team is practically universal. This ball field at the Lanett Cotton Mills shows the usual development.



ity if the new social venture is to carry through. Only by such means can the democracy aimed at materialize.

And the same is true in the South. A people who had no part in the life of the section are being brought back into its work and councils and, being the producers, they will one day control its destinies. Much may be said of the drawbacks involved in the unincorporated company town in the South, but the indictment is softened if it is seen that it is a feature of the economic adolescence of the section, for all adolescence tends to present values out of proportion, and breeds impatience, selfishness, uncalculating enthusiasm, over- and under-confidence. All in all, it is justly said that "the social conditions of the mill opera-

The picture at the top is a 3-room cottage that was the school house at Southwest La-Grange, Ga., in 1898 when the Unity Cotton Mills had just begun operating. One teacher handled the whole proposition. In 1916 the school building shown at the bottom was built and now has a teaching force of 23; average attendance 600; grades 1 to 9; complete dental equipment and service two days a week for school children. Operated in connection with the school is a modernly equipped cottage for domestic science instruction; a department for atypical children; and a completely equipped playground.



Some views among the mills of the West Point Manufacturing Company, West Point, Georgia. Fairfax, Shawmut and Langdale are separate villages serving separate mills.

tives. . . have improved during the last twenty-five years as rapidly as the operatives could adapt themselves to them." In any event, the judgment of the observer of their history a generation from now will be that, whatever their advantages or detractions as viewed from this instant angle or that, the mill villages were a natural and necessary stage in industrial upbuilding.

Mr. Tannenbaum has concluded that the South is burying its Anglo-Saxons in social stagnation and positive economic repression. For example: "These people are being denuded, stripped, washed out, destroyed. They are being reduced to a state of childish impotence where they have to be taken care of and where they produce nothing. They give the South no poets, no artists, no politicians, [Heaven be praised!] no orators, no teachers, no business men, no men of adventure, no builders, no engineers, no

The Mignon Senior Basket Ball Team of the Avondale Mills, Sylacauga, Ala.

technicians, no leaders in any field of activity whatever. So far as the community is concerned, they might as well never have been at all." And he thinks further: "One gets the feeling when he sees these long, emaciated figures, wan and sleepy-looking and without any vividness or interest, that it were far better had they remained on the farm and scratched the soil with their nails. It were far better that they had starved on bitter roots, killed one another in long family feuds, that their children had lived in ignorance and had gone bare-footed, ridden horses bareback and hunted wildcats, some going to the madhouse, some making moonshine, some escaping . . . into a mountain or valley school . . . . The adventure of living was not at an end."

While there is much to tempt the immediate observer to this view, the economic historian finds the matter different It is not true that "the mountaineer or small cotton farmer who moves to the mill village is lost to the community." It is his introduction to the community. It is not better for his children to hunt wildcats and grow up moonshiners than to be set physically and mentally right and afterwards make yarn and cloth. Mr. Tannenbaum misconceives life on tenant acres or upland hillsides to be an adventure. It possesses its own emphatic qualities of serfdom. The plan of life it represents has been tried, and has brought the South nothing. It is certain that the proportion of outstanding individuals coming from the mill villages has been as great, in an equivalent period, as the number coming from the poor whites in their old state. If one considers only the mill superintendents and presidents who have risen from operatives, this is patent. But it is more important to understand that what the South requires now is not spectacular figures. Of these it has boasted too many to its hurt. What it needs is a thrifty, cash-earning, school-going, health-conserving, industrial population, and the cotton mill operative in his thousands is conferring the most patriotic service upon his community and country.

The mill villages are not only an escape from the economic anaemia of rural lapse, but they are sure to be a door to wider participation. It is not gratuitous to suggest in a spirit of friendliness what an ever greater number of mill men are coming to see, namely, that there are signs current in the mill villages of growth into a new order. That man is most out of accord with his own time who does not sense that it holds in itself the seeds of change.

Southern cotton manufacturers, consciously and by force of circumstances, have possessed the character of economic statesmanship, and it is to this same responsibility which one appeals when he speaks of alterations which the future is likely to bring. Unless the best that has been accomplished by these men in the past has been totally mercenary and on other counts grudging, next steps in social evolution in

Auditorium for moving pictures, lectures, and similar meetings at the Shawmut Mill of the West Point Mfg. Co., at Shawmut, Ala.

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Pure paternalism, once necessary, is being modified and managements are finding that facilities, such as the use of welfare buildings, may in great part be paid for by the operatives enjoying them, with lightened burden to the company and increased interest on the part of workers. As this tendency develops, wages, now greatly supplemented by the bounty of the mills in a variety of services and subsidies from church to moving picture, will incline to be paid more and more completely in money. There are manufacturers who conduct no welfare work in their villages directly, but encourage improvement organizations of the operatives themselves as a substitute. Others feel definitely that as the first boon conferred by the mills was the bringing of families from isolation and poverty into com-

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Pure paternalism, once necessary, is being modified and managements are finding that facilities, such as the use of welfare buildings, may in great part be paid for by the operatives enjoying them, with lightened burden to the company and increased interest on the part of workers. As this tendency develops, wages, now greatly supplemented by the bounty of the mills in a variety of services and subsidies from church to moving picture, will incline to be paid more and more completely in money. There are manufacturers who conduct no welfare work in their villages directly, but encourage improvement organizations of the operatives themselves as a substitute. Others feel definitely that as the first boon conferred by the mills was the bringing of families from isolation and poverty into com-

munity living where they could earn, so the next desirable step is to relate the operative to the general body of the citizenship. The way is being paved for this by two tendencies; first, the fact that the operatives' station is no longer looked down upon by the rest of the white people as it was twenty-five years ago, and second, that growing manufacturing establishments with all the activities incident to community life cannot remain indefinitely near a town without incorporation to it or, if the mill villages are in sufficient number, without important forms of cooperation between the mills themselves which, in course of time, will work toward the same result. The Parker School District outside of Greenville is a case in point. Some manufacturers are glad their plants are located in towns. They prefer paying taxes to the municipal corporation and relying upon civic enterprise in educational and welfare matters.

The South, from a discouraged start forty-five years ago, is soon to be the chief seat of the cotton manufacturing industry of this country. New England is steadily losing ground in the race. Between 1904 and 1919 every state with a million or more active spindles lost in the percentage of its spindles to those of the whole country except South Carolina, North Carolina, Georgia and Alabama. Massachusetts, Rhode Island, New Hampshire, Connecticut and Maine lost. In the same period, while New England and the Middle Atlantic States together lost 11 mills, the South Atlantic and South Central States gained 53. The census which once needed to pay no attention to the southern industry and later gave it somewhat grudging reference, has narrowed praise of New England to a single state and reports a new statistical alliance in the fact that in 1919 more than half of the total value of cotton manufactures came from Massachusetts and the Carolinas. Between 1914 and 1919 the percentage of workers employed by corporations in all descriptions of manufactures increased faster in the South than in the rest of the country. Thus management is rapidly being standardized. In percentage of increase of fine goods, which may be held to reveal more than any other one item, the cotton growing states, between 1914 and 1919, had a score of 72.5, while New England registered a positive loss of 8.8. In the same period, while New England in the pounds of its yarn for its own consumption fell from 98 to 84 millions, the cotton growing states rose from 12 to 14 millions; in respect to yarn produced for sale, New England gained 2 millions while the cotton growing states gained 16.

As mills increase under southern enterprise and northern firms come south, competition for labor will be closer. Alternate occupations to that of cotton manufacturing will present themselves, and the phrase "once an operative, always an operative" will lose its meaning. The South will find it more and more difficult and be less and less prompted to cling to forced industrial differentials hitherto prevailing. The question will cease to be one of lessening distinction between sections, and will become one of the new industrial level to be reached in the South when her textile opportunities will be more completely occupied.

The South has long been approaching national standards. As she comes into national preeminence, the error of child labor will disappear and, whether through evolution of shop committees or organization into trade unions, workers will assume responsibility for their economic and social lives.

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Gymnasium for the girls at Hylton Hall, Riverside and Dan River Cotton Mills, Danville, Va.

Efficient instructors and teachers conduct regular gymnastic classes in this room which is equipped with all modern paraphernalia of swinging trapezes, dumbbells, etc. The classes are conducted on regular schedule to comply with the working hours of the girls, and the schedule also includes periods for kindergarten work for the little tots.

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An Intimate Story of Social Service

BY J. HARPER OLMSTEAD

One of the most important questions in connection with the present great textile expansion in the South is that which is concerned with the extent to which social service and educational work is beneficially affecting one of the fundamental factors of industry, the human element—which is potentially of a very high quality in this section.

That this work pays and pays well is shown by the phenomenal development of social service during the past twelve years in the plants of an organization which has been second only to the industrial expansion of the company itself.

While results of this work have been manifested materially in the formation of Women's Clubs, the establishment of libraries and recreation centers, and the introduction of compulsory education by the company in their villages (which, by the way, preceded the State law by several years) the larger results of the program are to be found chiefly in the increased interest among the employees of the company in the betterment of home and civic conditions. This last consideration is, of course, the chief aim of such work.

In order to illustrate in a more specific way the sociological outlines presented by Dr. Mitchell in his article entitled "The Cotton Mills in Southern Civilization" in this number of COTTON, we have, in Mr. Olmstead's article, tried to tell, in a more detailed way, of the work done at the several plants of a large southern textile organization, at the same time pointing out some of the results obtained by the methods adopted.

Self-appointed critics of the methods and systems adopted by the southern textile manufacturers will be deprived of one of their stock claims—viz., that we have selected a "show mill" as our illustration. As a matter of fact, so quietly and unassumingly has this company proceeded in its social service work that comparatively few persons know of it, and even now the management prefers to remain incognito, to which preference we are acquiescing.

The Editors.

Since the beginning of the educational program alone, the work has resulted in the establishment of three schools with 45 teachers and 1,750 pupils, six Women's Clubs with approximately 300 members, five domestic science classes with about 400 members, three libraries containing above a thousand volumes, two day-nurseries, enrolling practically 100 children, part-time classes in each of the three schools, with an attendance of more than 100 students. Medical clinics at several village units, with public health nurses and physicians employed by the company in charge; athletic clubs, girl reserves and boy scout troops in all of the village units—these are other features of the development. In addition, two large boarding houses for girls have been built. These buildings are thoroughly modern in every respect, being built of tapestry brick, steam-heated and furnished with hot and cold running water in every bed room. These homes are run by the company, a "house mother" being in charge of each. The girls in these homes are fed good wholesome food, given pleasant surroundings, regular habits, and consequently are healthy and happy. Each building is equipped for taking care of 150 girls.

The first social service work attempted by this company was the establishment of a kindergarten at one of its villages in 1911. After trying this for two years, the company decided that, although it was a good institution, it did not fill the needs of their people because of the lack of interest on the part of those employees who needed it most, and because the time of contact between the children and teacher was too short.

In 1913 the building which had been used as a kindergarten was converted into a domestic science kitchen and put in charge of a trained teacher. This was a great improvement over the kindergarten, but still it fell short of the anticipations of the management for the reason that it was failing to reach those who needed it most, for there were many who did not realize their limitations and did not feel its need.

So in 1915 the management put all the work under one head, making the principal of the school also superintendent of social service. The domestic science department was then transferred to the school, though evening classes were still maintained for any ladies who desired the instruction. This work was made compulsory so far as schoolgirls were concerned, for every girl in school, above the third grade, had it as a part of her course in school and since a family was not allowed to live in the village unless the children of school age were kept in school, this work began to function in first class style. Thorough cooperation on the part of the literary teachers also helped to produce results. They visited in all of the homes of their pupils, lived in the village, and became a part of the community life.

At the time of the absorption of this school by the company in 1915, the highest grade taught was the fifth, there being one little girl attending school elsewhere. In the first year of the new management a sixth grade was added. This grade continued in school until they had completed the eighth grade, by which time their number had dwindled from eight in the sixth to three in the eighth.

In 1919 a ninth grade was added, and, at the present time, 38 pupils are enrolled in the eighth and ninth grades, with 14 pupils, who have completed the ninth grade here, away at school. It might be interesting to know that of the 274 pupils who have been enrolled in the sixth grade and above during the past five years, all except 43 are still living in this mill village.

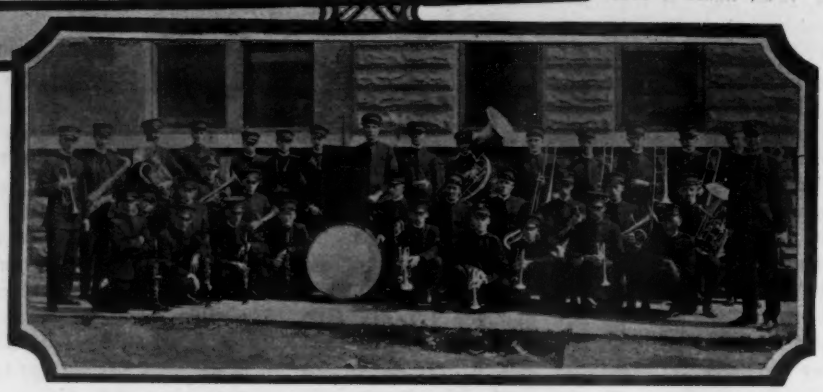
Another feature of this school is the part-time work. No pupil under 16 years of age is allowed to work more than

Four Mill Bands from Alabama.

At left: Senior band of Pell City Division of the Avondale Mills.

At right: Band of the Lanett Cotton Mills, Lanett, Alabama.

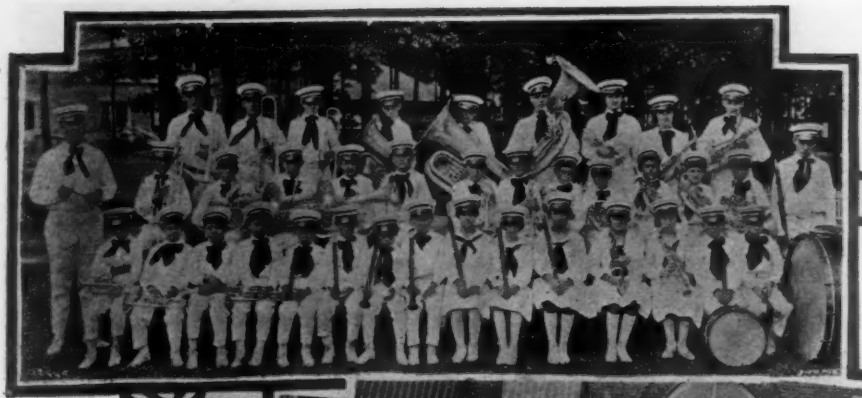
At left: Mignon Band, Sylacauga Division, Avondale Mills.



At right: Chattahoochee Valley Band, Langdale Mills, West Point Manufacturing Company.

half time in the mill, and is not allowed to work even the half day unless they have attended school the preceding half day. A card is used to give the desired information. These cards are sent from the teacher to the room overseer, and must bear the teacher's "O. K." certifying that the student has attended school the preceding half day, or else he or she is not allowed in the mill. Since this school is conducted for 48 weeks, instead of the regular standard 36-week school, more than 80 per cent of the students in this department make their grades.

There are in all departments of this school more than 1,000 children, and, during the past eight years, two mag-



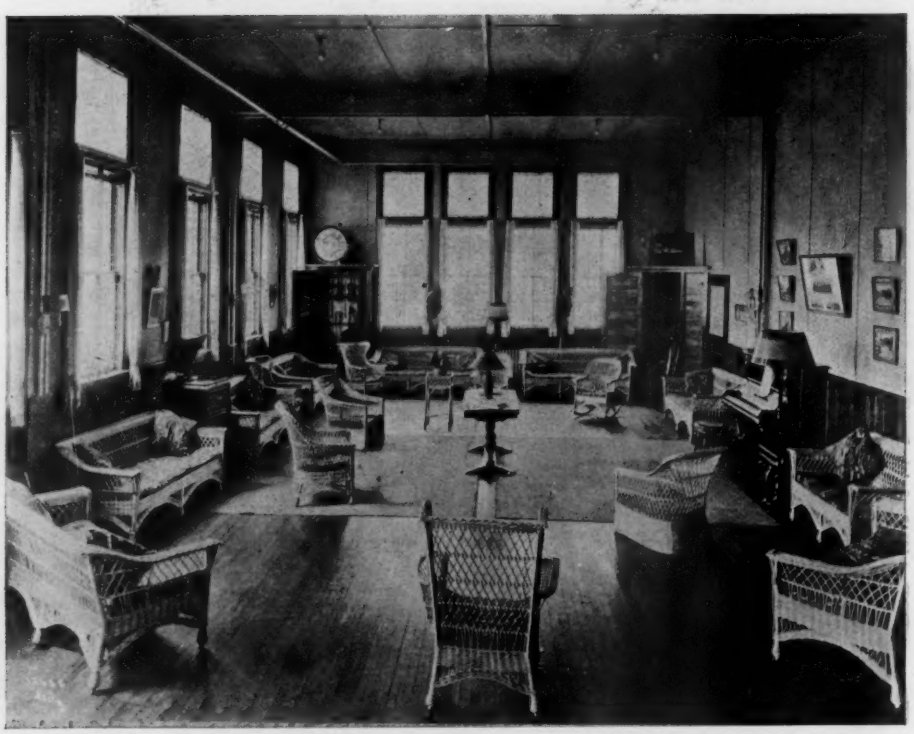
At left: Children's Band of Pell City (Ala.) Division. Avondale Mills.

At right: Band of the Riverside and Dan River Cotton Mi ls, Danville, Virginia.

Three more Bands from Alabama and one from Virginia. The others have them too—only we haven't room.

Members of these bands are all operatives or children of operatives.

nificent school buildings have been erected. These buildings are surpassed by none in the state, having every modern convenience, even to an automatic sprinkler system, so that the fire hazard is practically *nil.* In one of these buildings the first, second and third grades are housed, while in the other are the fourth, fifth, sixth, seventh, eighth and ninth, with music room, sewing room, library and domestic science kitchen. In the auditorium of this building, which is fitted with the very best opera chairs, is a Chickering grand piano, donated to the school by the Women's Club



A rest and recreation room for the Band members at Mignon, Ala. A picture of the band that makes use of this room may be seen on page 220.

of the village.

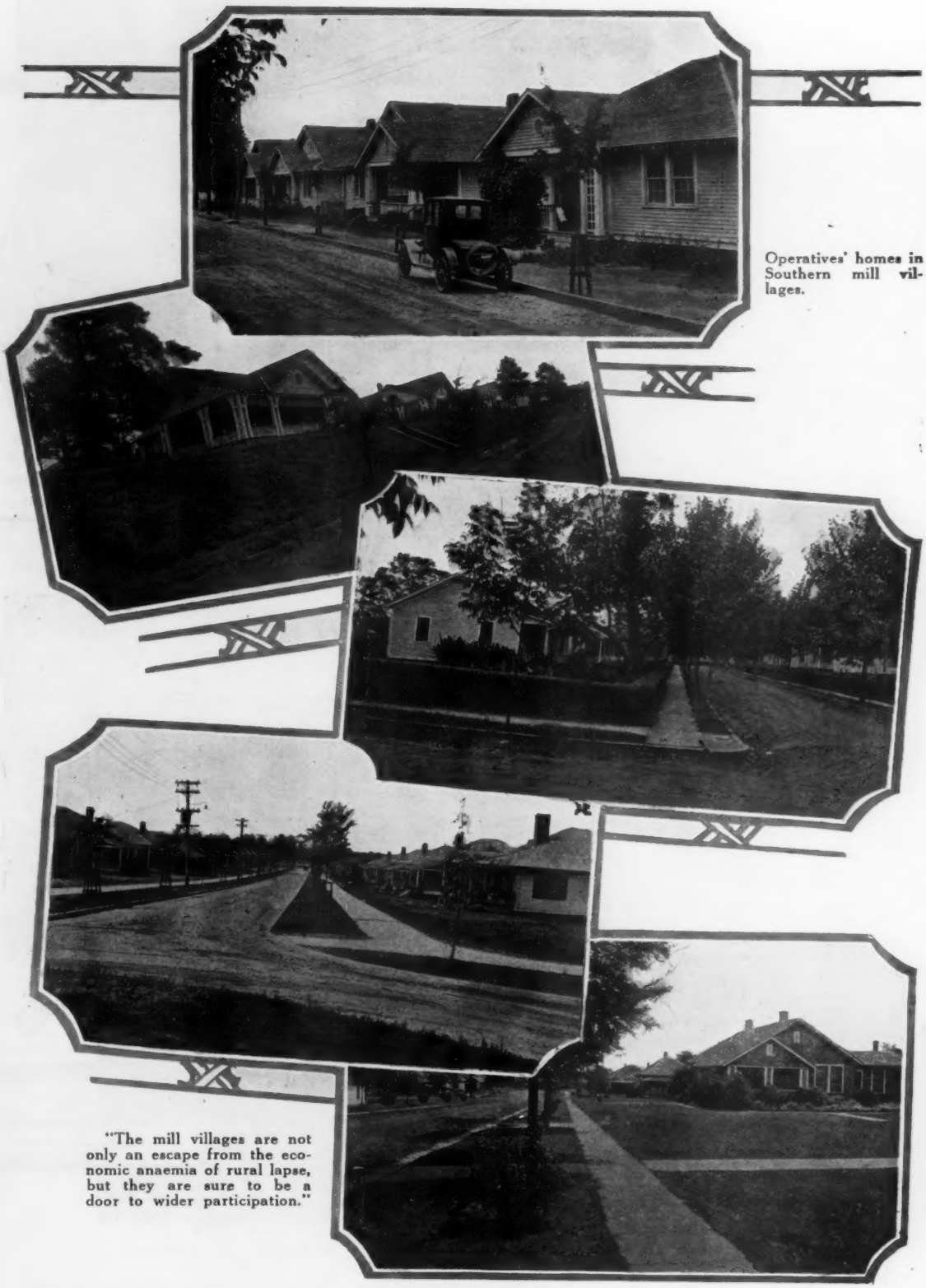
Another element contributing largely to the making of an ideal village is the establishment of clubs and fraternal orders. There are six fraternal orders here, besides the Women's Club, the Club for Young Ladies, the Girl Reserves, the Boy Scouts and Athletic Clubs. The Women's Club has aided especially in making for better health and better people. The cooperation of these ladies is wonderful. They use the club as a medium through which to exchange recipes and discuss care of babies and growing children. The result of this has been a decided decrease in sickness and fatalities among children in the village.

The first efforts of this club toward a "clean-up" campaign were made in 1917. They offered ten cents per hundred for all old tin cans collected over the village. In response children immediately gathered up over 30,000 old cans. This also showed the inadequacy of the garbage removal system, and, at the request of this club, garbage cans were placed in every yard. It is a perfectly safe statement to make that, at no time since this campaign, would it be possible to collect 30 cans off the whole village.

The next campaign undertaken by this club was one of beautifying the village. They divided up the village into six districts and offered one first prize of $10.00 and a second prize of $5.00 for the most attractive yards in each district. In this campaign, the club members made a "house-to-house" canvass and enlisted the interest of everyone in the community. Now a home without flowers is rare in the village, and many homes possess some wonderful specimens of ferns and many other plants.

Sanitation is also stressed in every grade of school from the first. Children are taught the necessity of using screens,

An Eighteen-room apartment house in a mill village for those who prefer close neighbors.



Operatives' homes in Southern mill villages.

"The mill villages are not only an escape from the economic anaemia of rural lapse, but they are sure to be a door to wider participation."

Riverdale Kindergarten.

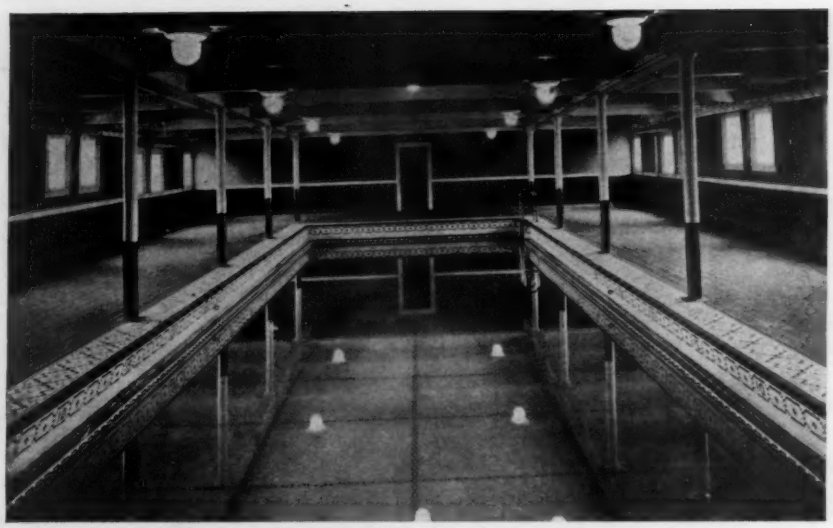
Fairfax Kindergarten.

Kindergarten Exterior and Interior at Plants of the West Point (Ga.) Mfg. Company.

etc., as well as personal hygiene.

The Girl Reserves and Boy Scout troops have also rendered invaluable service in this program of community building. At present there are four troops of girls and three of boys. Their influence is wide-felt and uplifting.

The Sunday schools and churches have contributed an inestimable share toward the building of communities. A Christian man or woman is naturally more self-respecting



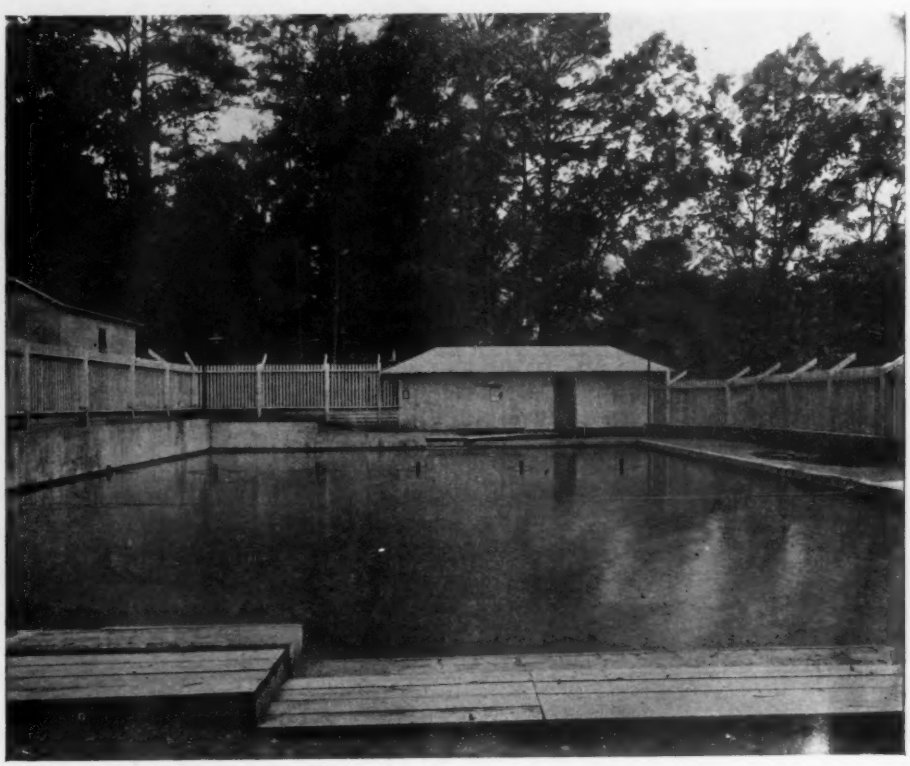
Swimming pool in the community house at the Massachusetts Cotton Mills, Lindale, Georgia. The water is filtered, chlorinated, warmed in winter, and frequently changed. Every feature in this community house is paid for by the operatives when used—and they are fully used — thus making the building self-sustaining.

and has more care for himself or herself, and it has been found that as the people become more healthy and happy, the church attendance increases in proportion.

The sick of this village are not neglected as two regular municipal graduate nurses are employed, whose work is to visit the homes, ministering to those needing their care, directing the members of the family in regard to caring for the patients and in protecting themselves against the contracting of disease, and giving instructions in sanitation and disease prevention. Also, daily clinics are held with a skilled physician and nurse in charge, and often as many as 75 patients are treated here daily. In many instances serious sickness has been arrested by a timely treatment in the clinic. This clinic is absolutely free.

The nurses also visit the schools and examine school children, many times advising their teachers in cases of defective hearing or vision. Parents are then notified and many cases of diseased tonsils, adenoids and the many maladies peculiar to children are given attention and corrected, giving the child an opportunity to develop into a "four square" citizen.

Still another phase of the work at this village is the employment of a dentist by the company. This gives all employees the benefit of dental care and hygiene at a cost



An outdoor swimming pool at the Langdale Mills of the West Point Mfg. Co., Langdale, Ala. The dressing room may be seen at the far end of the pool.

More than one hundred outdoor and indoor swimming pools are now in use at southern mills and each year sees additions to the supporters of this popular and healthful sport.

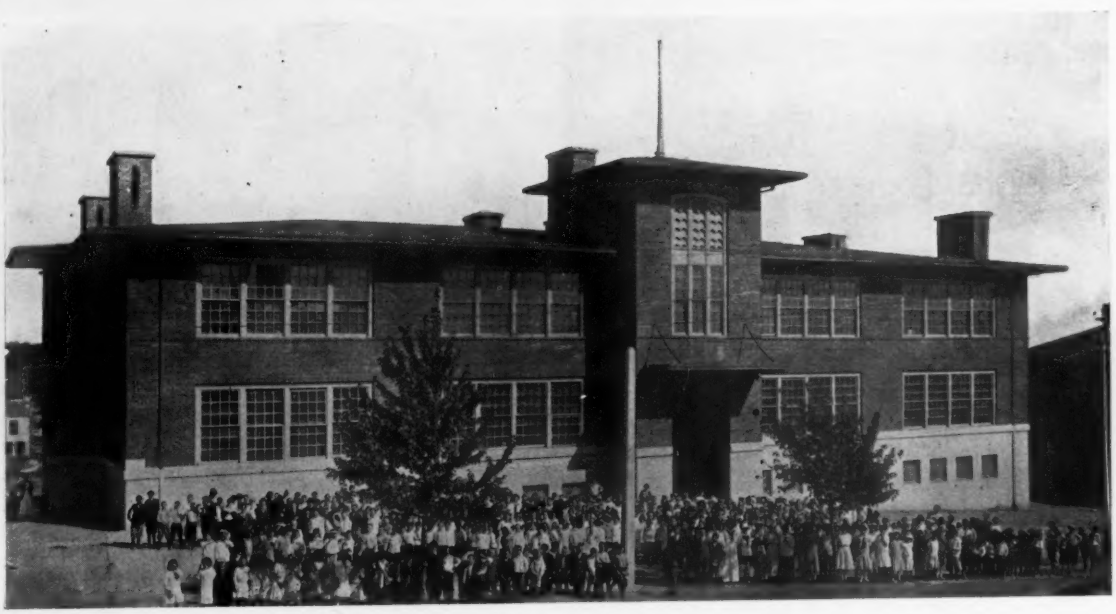
Girls also make good "Scouts." Here are a few from one of the Avondale mills. The importance of such social work lies, it is needless to say, not so much in the fact that so many more pupils have been made, so many more teachers acquired, or clubs organized throughout the villages, as it does in the change that has been wrought in the employees themselves and the contentment and the new vision that has been given them.

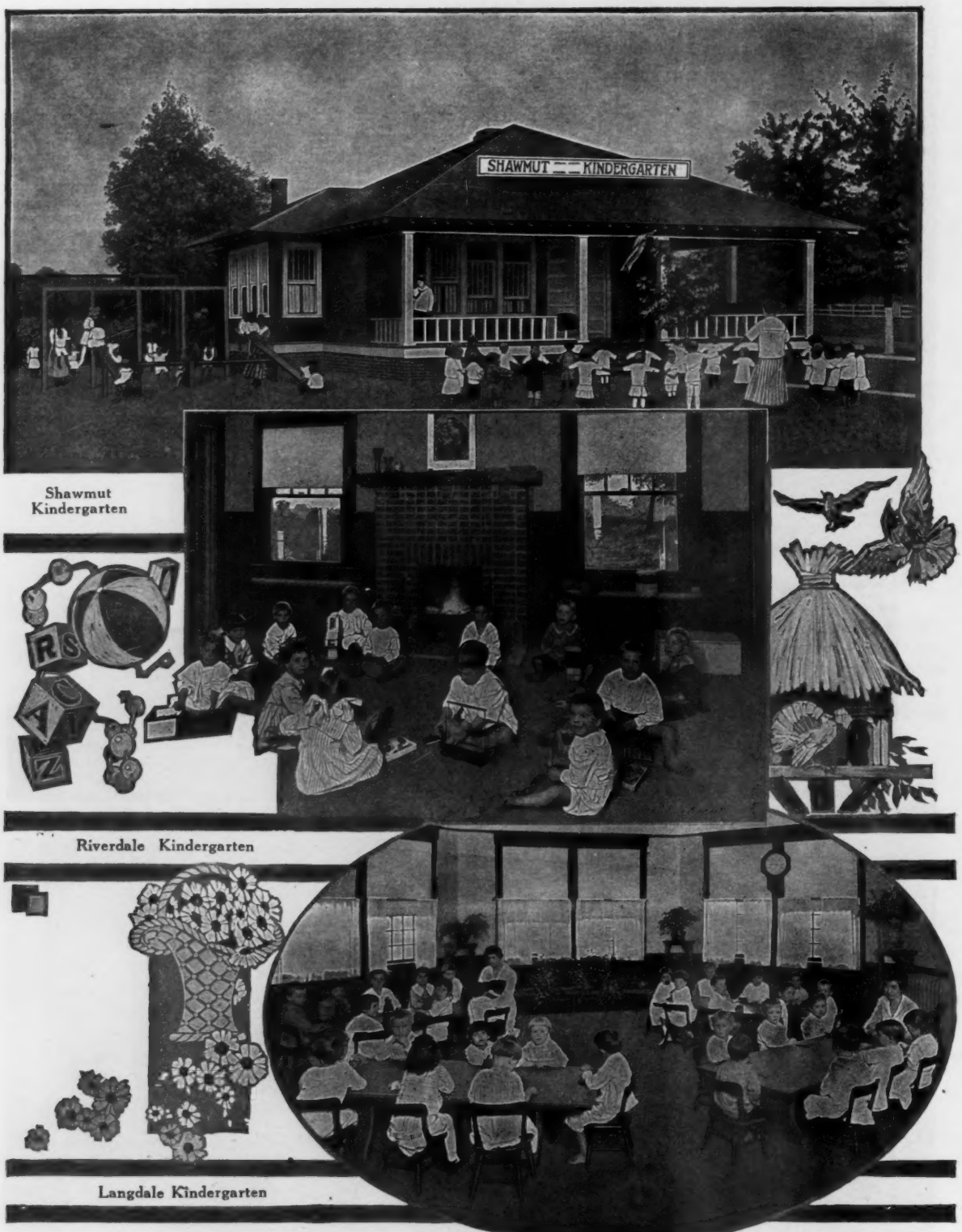
much lower than they could secure this service elsewhere.

Last, but by no means least important of the institutions developed here is the day nursery. Children are brought here by their parents as they go to work in the morning. A matron, trained and experienced in the care of children, is there to receive these children in a warm, comfortable house. These children are given a warm bath and put into a nursery uniform. At nine o'clock they are given a lunch of bread and milk, then at noon they are given a good substantial dinner suited to their several ages. After dinner

The Reception Room at Hylton Hall, Riverside and Dan River Cotton Mills, where the girls may receive and entertain their young men friends. The lady in the left center is the chaperon or house mother who is always in attendance. The glass doors along the sides open into small alcoves where "twosomes" may be conducted.

From a small four-room building, housing less than 100 children in 1908, the public schools of Schoolfield, the village of the Riverside and Dan River Cotton Mills, Danville, Virginia, have grow to a system comprising two large brick buildings, and one eight-room frame building (which housed the entire school ten years ago) with a total enrollment of more than 1200, an average attendance of something over 900, and a faculty of 42. Since 1912, the departments of Home Economics Industrial Arts and Physical Education have been added. Every girl in school from the third grade up, receives instruction in cooking and sewing. Every pupil enrolled has access to a swimming pool and well equipped gymnasium supervised by specially trained workers.





Starting the kiddies on the right track. More photographs from the mills of the group controlled by the West Point Manufacturing Company, West Point, Georgia. This is but typical of similar work at other mills in the South.

their faces and hands are bathed and they are all put to bed for an afternoon nap. At three, they are fed another lunch of milk and bread and then changed to their own clothes ready for their parents to get them as they leave the mill. Much attention is given them during the day in regard to entertainment and discipline.

In 1917, this work, having passed the experimental stage, was extended on even a larger scale to another village of the organization. Before this time the company had given to the county the use of one of their residences as a school building. This school was composed of three teachers and about 100 pupils. The superintendent of schools and the county board gladly cooperated with the company in the establishment of a new school, the company furnishing buildings and equipment and the county giving its share of the public money for paying its teachers.

With the inauguration of the new policy an appropriation for $200,000 was made by the company for the erection of buildings necessary for carrying on this work. These include a dormitory for girls, a school building, domestic science kitchen, sewing room, picture show equipment, tile-lined natatorium, gymnasium, playground equipment, library, scout room, clinics and community room. The school at present has an enrollment of about 600 children with sixteen teachers employed. More than 100 girls are given daily instruction in home-making and care of the sick.

The Women's Club here, as in the first village, has been largely responsible for the wonderful development of this village. The library at this unit was established by this club, while the latest enterprise which they have undertaken is the purchase of a $1,000 grand piano for the school auditorium.

In the Spring of 1918 the company had the same understanding with the county superintendent and county board of still another county with reference to the school at a third village, as they had at the two already described, and took over the school at this place. While this unit is so small that great expansion is impossible, this school has grown from two to four teachers. A community room, equipped with a new piano and dishes and silver, etc., for extensive entertaining, has been established. All social activities are directed by the teachers in the school, together with the Women's Club. This club has established a library, furnished kindergarten chairs for the primary department, and improved the social life of the village in many ways.

In the other villages operated by this organization substantially the same program is carried out with the exception of the schools. The company hopes at some time to be able to make the same arrangements as at the other centers, and then the work will be entirely the same.

Handsome auditoriums have been erected in each village, with club rooms, shower baths, domestic science kitchens, moving picture machines and every device for making their people better and happier. A social worker and a graduate nurse are employed in each village. These workers make their homes in the community and are a part of its life. Women's Clubs, athletic clubs, girl reserves and Boy Scout troops function admirably. An athletic director has charge of the work among the men and boys.

A Union Sunday School in each village is one of the most helpful institutions of these units, just as in the others. The average attendance at these schools is fully fifty per cent of the village population. This drawing power of the Sunday Schools is a great source for generating that feeling of "brotherly kindness" so necessary in a happy, contented community.

Domestic science classes are taught in each village and have awakened a pride in the homes that is compelled to make our next generation one of home-makers. Since dissipation and mis-use of holidays, of a kind known to most employees, is a great enemy to health, these classes are strong factors in the building up of a healthy citizenship as well.

All kinds of entertainment is provided for the people in these villages. Almost every night in the week a visitor will find some activity in one of the handsome auditoriums or community houses. In fact, one of the outstanding expressions of the social work is that which is embodied in the various social gatherings of the employees. These meetings are attended by both young and old, and are looked forward to as a means of throwing off the cares of the

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A Row of Operatives' Homes in the Village of the Exposition Cotton Mills, Atlanta, Ga.

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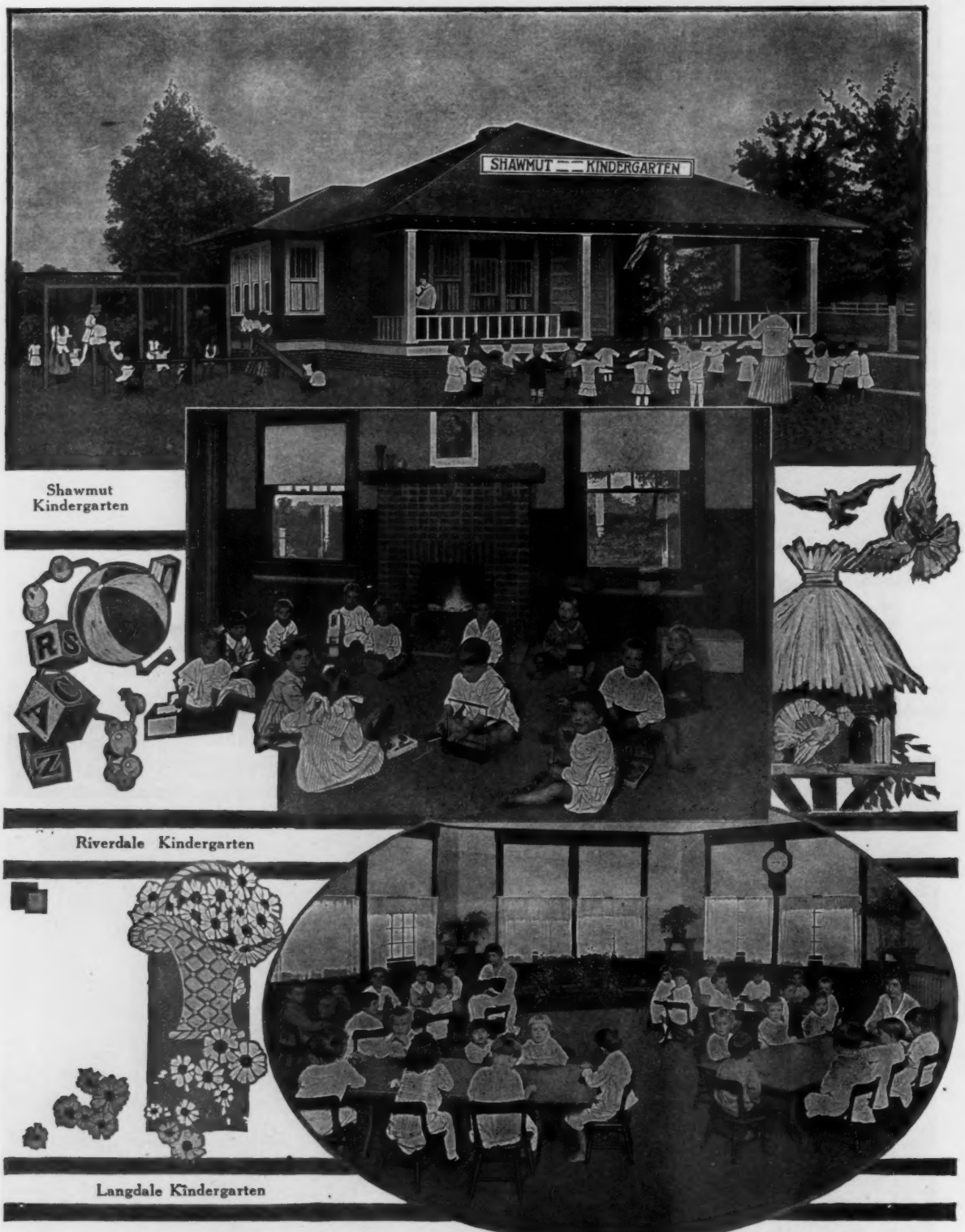

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day. The lack of such meeting places in former times, perhaps, explains in part the present popularity of these affairs.

In presenting the foregoing facts an attempt has been made to set forth, as clearly as possible, the more material side and results of the social service and educational program that is now being carried out by this company, but these things, as facts, have the usual limitation of facts. To one unaccustomed to this particular kind of work they represent, no doubt, an achievement, but they do not tell of its real importance. This importance lies, it is needless to say, not so much in the fact that so many more pupils have been made, so many more teachers acquired, or clubs organized throughout the villages, as it does in the change that has been wrought in the employees themselves and the contentment and the new vision that has been given them. To the sociologist and the state builder, these last are the paramount considerations. It is to the credit of the officials of the company in question that they were able to place themselves in the latter class and to visualize the eventual result of such a system. This sentiment pervades the organization from the chairman of the executive board—who has always exhibited the keenest interest in any project which has for its purpose the bettering of the conditions of his employees—down through the whole system. Without the unstinted cooperation of the superintendents in each organization, the work could have spelled nothing except failure.

One of the outstanding elements in the present consideration of southern labor is the fact that employees, particularly in the textile industry, are a pure Anglo-Saxon stock and potentially have great ability, not only as operatives, but also as high-class citizens. The success of the work of this organization during the past 12 years has proven this. The net result of the program herein discussed has been the bringing out of these qualities to a surprising extent, as shown particularly in the avidity with which many of the employees seize the opportunity for cooperation with the company for the betterment of the condition of their families and their communities.

The compulsory school, when first put into effect, weeded out much of the undesirable "floater" element and resulted in a more stable and trustworthy population in the mill villages. The school program and the attendant social service projects have also attracted to the villages many farmers of a very desirable type, who, because of agricultural conditions and poor school facilities, determined to leave the land, and who, under the old conditions, would have gone to the city rather than to the mill villages. As an illustration of this fact, a member of the school board in the county in which one of these villages is located, in discussing the village school recently, deplored the fact that the better element of his community had been attracted to the village by the many superior advantages there. This would certainly not have been the case previous to the program of social betterment outlined.

A great deal of the initiative in this plan of improvement is now being taken by the various organizations of employees. Under the guidance of the company almost all of these organizations are self-sustaining and the latest undertaking in this direction is the erection of three modern church buildings in one of the villages, toward which the employees themselves will contribute approximately $15,000. These funds to be generously supplemented by contributions from the company.

The Hotel or Rooming House at Shawmut, Ala. Completely Equipped with all the Conveniences of a Modern Building of this Character.

In the several villages outlined in this article there is in evidence a new optimism and a determination for self-improvement manifested, not only in the cooperative work of the employees' organizations, but also in the individuals. The hopes of individuals and particularly of children whose education has been carried out under this system are being realized. The vice-president of the company is donating several scholarships for this purpose.

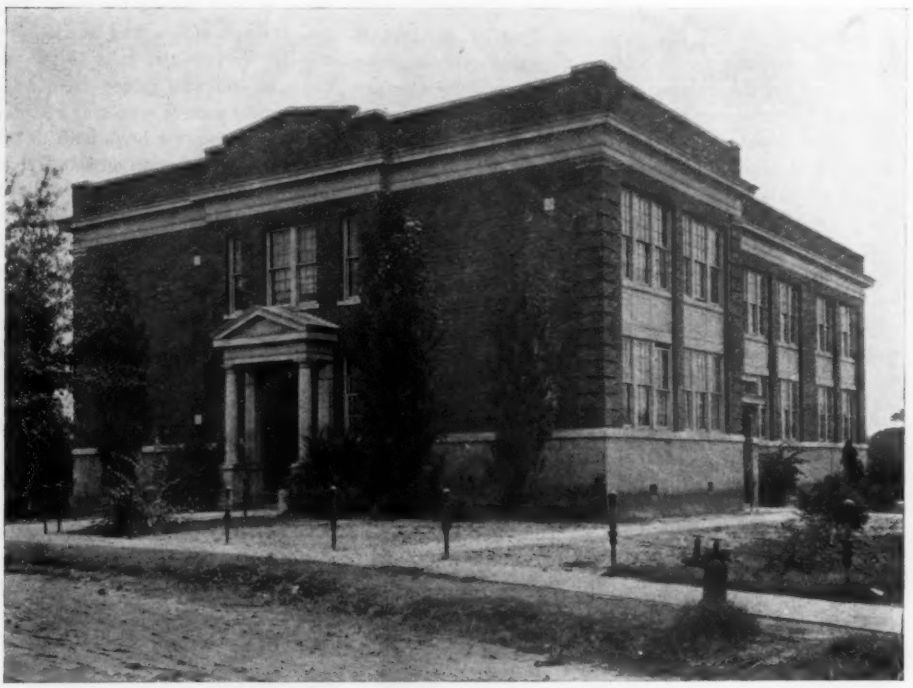
Surely, in the light of these results, it is no little work. Indeed it is one that has recommended itself to all southern textile employers who have the best interests of their business and their country at heart.

A Physician's Angle on Social Service

BY A MEMBER OF THE STAFF

The account of the very effective efforts of one southern mill toward producing in their village a condition of proper community sanitation, personal hygiene, and in reducing disease, and in spreading the gospel of proper eating and correct foods—with the very practical result of a healthier, stronger people and more regular attendance at work on the part of the operatives—makes a story of direct interest to the progressive mill manager.

In some respects, this line of effort is similar to that conducted in the regular educational channels in the schools, the *modus operandi* converging into the same line of activity. As an illustration of this, the work of the domestic science teachers at the schools is so extended as to directly affect and aid the mothers in the homes as well as the children in the schoolroom.



The School Building at Shawmut, Alabama. 14 rooms, 19 teachers Average number of students 600. The figures for teachers and students include a temporary school with four rooms.

In other features, however, there are at this mill many accomplishments in the direction of community welfare and the raising of health standards which have been developed by special effort and the results of which are very apparent. The story of how this work was—and is being—carried on was told recently in the following interview with a man who for a number of years has been engaged by the mill as clinic physician and is in charge of their health program. In addition to his general supervisory and consulting work in the village, this physician regularly spends several hours each afternoon during the week at the mill health clinic, where he attends cases of both schoolchildren and millworkers.

"Several years ago," he said, "we found a rather general practice in the village on the part of the housewives of cooking up great quantities of food at a time; they would eat what they wanted at one meal and leave the rest on the table, oftentimes an accumulation of bread and meat and other victuals all thrown together in a jumble, and this unhealthful, unsanitary homogeneous mixture was left so that it was accessible to the children and other members of the family. The mother's idea was that she could cook enough at one time to last several meals.

"The result was a noticeable number of cases of gastric disorders and other ills caused by this practice; and we also had some cases of pellagra resulting therefrom.

"In the campaign against this custom the domestic science teachers in the schools, working through the medium of the school children and mothers' clubs and other agencies in the village, waged a drive against such things as this—and where three years ago pellagra was a fairly common disease in the village, I don't believe I've seen a case since this work got under way. The people have been instructed as to the proper foods to prepare, how to prepare them, and as to the different food values of various foods. Of course we have not attempted to go into the intricate details of the number of calories contained in each food element, and things like that, but have tried to teach them the fundamentals of proper eating, encouraging them to eat a mixed diet as regards the different elements of various kinds of food. As a result there has been brought about a great improvement in the general health of the community.

"Quite naturally, this venture into the realm of cooking opened up other avenues of work. Formerly the village had surface toilets, which were recognized as a detri-

Beverly Hall, the home of Mignon's sixteen school teachers, and its cafeteria adjunct. The hospitality dispensed here is in keeping with the old ante - bellum southern architecture of the building.

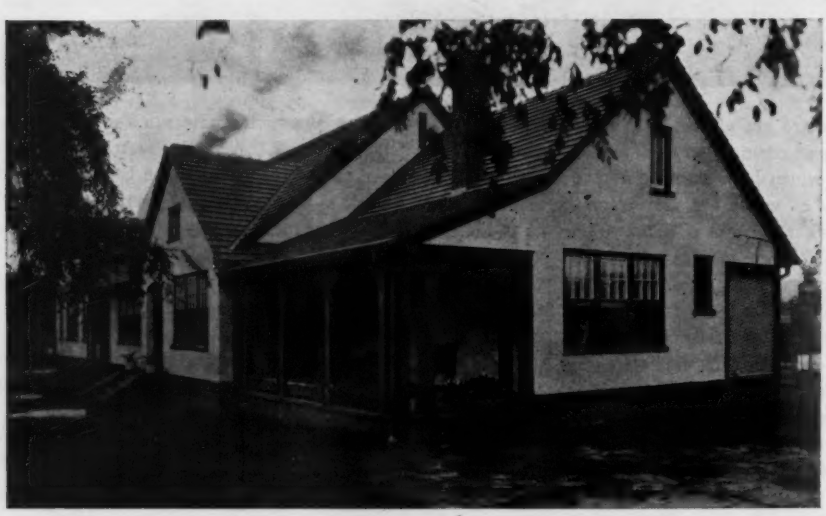
ment to the community health and welfare, and we installed septic-tank toilets, but these also did not furnish the result desired, so we finally put in water closets and sewerage throughout the village. This improvement, together with the correction of diet, has so improved conditions that it is a very rare thing for us to have a case of typhoid fever or pellagra on the village, except when such diseases are imported by newcomers, and such cases are promptly reported and isolated until beyond the point of danger of contagion to other inhabitants.

"Another thing which has aided us greatly is the fact that for a long time the company has maintained day nurseries in charge of competent individuals. Here the children of women who work in the mill are brought in the morning by their mothers and left until afternoon. They are properly cared for, given nourishing food and proper recreation and rest, bathed regularly, and are taken again by the mothers on their way home. This has helped from a number of angles; the mother is allowed to engage in productive effort at her place in the mill, knowing that her child is receiving the proper care and attention instead of being left in the home under the care of an older brother or sister —and we know that we are building up our future citizens, the workers of tomorrow, in the right kind of environment and under the proper care."

In explaining the method of determining cases of sickness in the village, the physician continued: "Each morning there is a list furnished of the people who are absent from the mill from all causes. This is turned over to our two trained nurses and social service worker, who check the list by personal calls to see who is absent because of sickness and who is out from other causes, and all cases of sickness receive whatever attention is necessary, at once. This means quite a help, both to the mill and to the person who is sick, because, ordinarily, if the matter were left to the personal action of the individual, the case of sickness might continue for as much as a week without aid being requested, but in this manner, just as soon as the person is out, the nurse is furnished with the name and the proper measures taken.

"A thing that has given us about as much trouble as anything else has been infantile diarrhoea, caused by the presence of houseflies without any measures being taken by the individual, in a large number of cases, to exterminate them. This we alleviated by equipping the houses with screen windows and doors."

It was emphasized that these were by no means the complete outlay of health measures adopted and in force at this village—that there were many others—but that these represented some of the major efforts which produced satisfy-



Nurses house and kindergarten at the Massachusetts Cotton Mills, Lindale, Ga.

The real value of having capable and trained women always on the job and giving their careful attention, not alone to the sick, but also to the proper care and feeding of the children, has been demonstrated many times among the mills of this section.

ing results, results which cannot be represented in cold statistics and graphic charts, perhaps, but in a happier, healthier, more intelligent people—which is decidedly the more valuable and worthwhile index.

There is, of course, an extreme necessity for great discretion in the selection of the workers for this activity, it was explained, and for the exercise of diplomacy and tact, in the administration of the work. "Some of the people, particularly the newcomers in the village, called our efforts 'meddlesome interference' at first," said the physician, "and it was up to us to convince them that this work was for their betterment and improvement, and a large part of our work is education along this line in showing the people unaccustomed to this type of improvement how it can raise them to a higher plane of life and living. The encouraging part of it is that when we do show them, they respond in a manner that is of greatest assistance to us in the furthering of the work, and are anxious to help us in every way.

"Outside of the methods explained and others of a similar character, it would be hardly possible to lay down any strict rules for the pursuance of our work. It is simply a case of gradual and constant education of our people into the necessity for better homes, better eating, better living conditions, higher standards of personal hygiene and sanitation. All of us, doctor, nurse, social service worker, school teacher, and those of the people who have already seen the light, and are practicing what we preach, must be always on the job together, helping here, demonstrating there, always showing them the better way."

A Quarter Century of Progress in Dyeing

BY "TEXTILUS."

This is one of the most difficult "assignments" I have ever had, since, in endeavoring to "cover" it, I am compelled to delve very much into the past, and bring forth much that may appear as ancient.

From an industrial point of view, the development of dyeing in the South has been very gradual, extending from that period when natural dyes only were used in the homes, and in the smaller dyehouses, until the coal-tar dyes began to make themselves felt in the late eighties. These latter dyes can be safely exemplified by two important types, viz., the sulphur blacks and benzopurpurine (1885). Many were the wild scrambles of the dye salesmen in the decade of 1890-1900 to interest the mill owner or operator, superintendents, and dyers in those two classes of dyes, and the cutting of prices and qualities—cutting anything to beat the other fellow to it, and clinch the order or contract. Many of the men on the road in those days will remember that the fair price for good old benzo was from 40 to 45 cents, while "jags" of it were shipped South and billed at sixteen cents. This sixteen cent price only represented sixteen cents worth of a strong dye imported at a price to sell at 40 to 45 cents, after being "reduced" with 37½ parts of common salt to 62½ parts of strong dye to make 100 parts of the "commercial article."

These conditions did not apply only to benzopurpurine, but were duplicated in many other dyes, and continued until some of the abuses became so flagrant that the managements of many of the southern mills began to look into the matter for themselves and take less for granted. This action was the beginning of an awakening which has ultimately led to the establishment and financial and moral support of the present textile schools that now supply the southern mills with many of their trained young men.

The gradual development of dyeing in the South has been due, in great measure, to the thought that has been gaining, during a number of years, that the dyehouse can be just as well near the place where the cotton grows as elsewhere. There is no reason why yarns or cloth made in the South cannot be dyed where it is fabricated, as to ship either or both of them North for the same kind of processing. Of course, at one time, no doubt, it was easier and cheaper to ship North than to erect and operate dyehouses, but those who have given this feature any consideration, see that it is just as feasible to operate a dyehouse South as well as North.

At one time the prevailing idea in the South was to operate large numbers of individual knitting mills—hosiery mills—and to have a small dyehouse attached. This was the time when almost every one thought that dyeing was so simple and easy that anyone could be a dyer without much training and operate a dyehouse at a profit. Many individuals now living in the South can testify to the fallacy of this idea. Later, when the sulphur blacks came

<> School house at the Fairfax Mill of the West Point Mfg. Co., Fairfax, Alabama. <>

pouring into this country from Germany, the dye salesmen were endeavoring to convince prospects—small mill men—that their salvation depended upon the erection of a dyehouse, install a rotary dyeing machine, and be independent of all outside "extortions." The writer well remembers a small stocking mill operated in an abandoned mill or barn, alongside a creek in central North Carolina, and in which was then being erected one of the first "pack dyeing machines" constructed in this country. The owners of this "mill" knew positively nothing about dyeing, but through the persuasiveness of the dye salesman, were induced to take on the sulphur blacks, and buy one of these new and untried machines to apply it. They had no regular dyer—owing to the simplicity of the process, "no regular dyer would be needed." Since the dye would be so uniform, all the improvised dyer would be required to do was to weigh out the correct amount of dye for each batch of 100 pounds of material to be dyed, and thus proceed from batch to batch. It is needless to observe that this mill, in time, gave up its "dyehouse" and returned to the former practice of sending its knitted goods to a regular dyehouse where a dyer who had learned his trade was in charge, the result being that a better product was obtained at a lower and more uniform cost. This is not an isolated instance.

As newer dyes came upon the market that were adapted to cotton, no time was lost in bringing them to the attention of users in the South; in some instances, the southern mill men saw at once the advantage of employing such dyes, and rather than run the risk of having an unusual quantity of defective dyeings on hand to be subsequently worked up, at once engaged the services of northern dyers, with the result that a number of well organized dyehouses sprang up all over the South, and many of them are operated today. It is also worthy to note that some of these old dyers are now the representatives of some of the important dyestuff houses selling both South and North.

With the constant development of cotton dyes, commencing with the old line of direct dyes, including benzopurpurine, Congo red, chrysophenine, benzo orange, the trisulphon browns, diamine blues, and innumerable others, used not only for hosiery but for yarns for ginghams, the mills in the South gradually became familiar with the newer methods of dyeing, and when the diazotized and developed dyes came upon the market, the dyers were ready to take kindly to the then last word in cotton dyeing. This process was, and is today, very largely used in the South, and occupies a position not easily filled with other dyes. When the diazotized dyes were at their best, then came the fast direct dyes that opened a new lead in the production of ginghams, of course, coupled with the well known sulphur dyes.

The vat dyes, finally gave the dyers the long-looked-for fastness, and in no part of the country have they been made more intelligent use of than in the southern mills. The vat dyes stand in a class by themselves, and naturally have gradually displaced nearly all other dyes used formerly for the better classes of ginghams. These dyes called for a new school of dyers, and the result was that many of the younger men of the South, not only in the textile schools, but in the mills, applied themselves energetically to mastering the intricacies of the processes for their application. One phase of this work of these young dyers was that as soon as they showed familiarity with the "vats" they were offered very good positions with some of the dyestuff houses, either as dye salesmen or technical demonstrators.

In a measure, this is unfortunate for the mills, this losing good men that they have trained for their own work, but it should serve as a lesson to them that modern improvements in their dyehouses and adequate compensation, commensurate with their abilities, should be offered. Good vat dyers are not plentiful, and when a good one has been developed in a mill, its management should make the inducement worth while for the man to remain.

One cannot make a mental survey of the dyehouse activities of the South without realizing the immense opportunity which that region affords for the development of some important part of the dyers' art. The writer cannot but believe that it will be in the South that the greatest development of dyeing machines will be accomplished. This is no idle thought. Years ago this opinion was advanced, and today it seems to be more real than ever. While immense quantities of cotton will continue to be dyed in the North for immediate consumption in the mills there, the South will also continue to increase the amount of dyed cotton that will be both consumed locally, as well as shipped in large quantities North. There is no doubt but that the greatest improvements in beam dyeing will be made in the the South, since it is one of the logical steps that lead to shortening the manufacturing operations.

No mention of dyeing in the South would be complete without reference to the immense use of indigo. Of course, every one knows that any real denim is not complete unless it has been dyed with indigo. Efforts to displace indigo with the sulphur blues have been only partially successful, since the trade always comes back to indigo, and will accept no substitutes. When the sulphur blues were being pushed in the South as a substitute for indigo, the one thing that acted as an obstacle was the great difference in the odor of sulphur dyed goods in comparison with those dyed with indigo. The peculiar odor of indigo was wanting. It did not take the enterprising German chemists very long to send to this country some substance, a few drops of which placed in the case containing the sulphur dyed goods, imparted to the pieces the very same odor as though they had been indigo dyed.

One of the most encouraging signs of the times affecting the advancement of dyeing in the South, not only as relating to cotton, but to wool also, is the interest in the southern textile schools. These institutions are doing excellent work, and the class of young men attending them compare most favorably with those who attend similar schools elsewhere. These schools are destined to be the real feeders for the mills South with dyers and other technical men, and they should receive all the support that they require. As to dyeing and the collateral arts, there is no reason why these schools should not have the fullest equipment for carrying out all the work in the coloring of textiles, including printing, bleaching, finishing, etc. The mention of printing, leads to the thought that in time, print-works will be in operation, and when this is the case, then will the South be in the enviable position of claiming the entire cotton industry for its own.

Twenty-Five Years' Progress in Finishing

BY DUNHILL MARSDON.

Commercial bleaching and finishing in the South had its first practical inception with the building of the Kerr Bleachery & Finishing Works at Concord, North Carolina, in 1890. While there had been some dyeing and finishing done in this section prior to that date, it was, insofar as the writer has been able to determine, entirely confined to privately operated plants located at individual mills.

The next commercial plant to be undertaken was the Lanett Bleachery and Dye Works at West Point, Georgia, which was built in 1895. While the main office is at West Point, the plant is really located at Lanett, Alabama, which is just over the State line from West Point.

Next in point of seniority comes the Ohio Falls Dye & Finishing Works at Louisville, Ky., which was started in 1897. Then, about 1899, the Clearwater Bleaching and Finishing Company, at Clearwater, South Carolina, made its appearance, to be followed by the Union Bleaching and Finishing Company at Greenville, South Carolina, in 1903.

Lowell Bleachery South, of Griffin, Georgia. The newest southern commercial finishing plant completed and in operation.

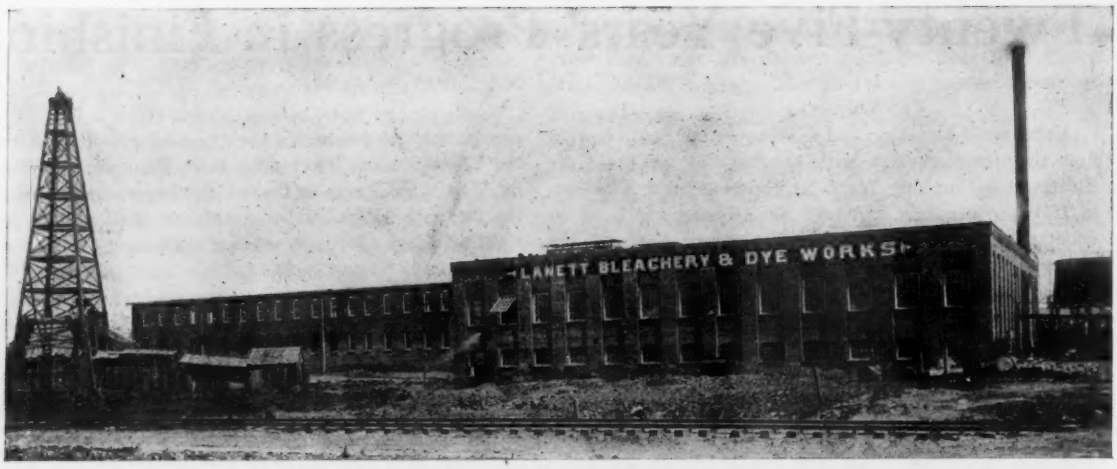
The building of these five plants in this thirteen-year period marked the actual beginning or rise of the industry in the South. Prior to and during this period, and for that matter for many years thereafter, it was proclaimed vociferously that bleaching and finishing could not be done in the South because the water in its streams and rivers was muddy or silt bearing and could not be filtered satisfactorily without great expense. Therefore, the investment of capital in this particular direction was looked upon as a gamble, a speculation that might pay but probably would not. It was because of this feeling that the earlier plants were built upon a small scale, and frequently to conserve some private end.

Let us consider for a moment the plant at Lanett, Alabama. It was originally designed to handle the product, or a part of the product of the group of mills located along the Chattahoochee River near West Point and controlled by Wellington, Sears & Co., of Boston, who also financed the finishing works. It originally consisted of two principal buildings and a power house containing two boilers of 100 hp. each.

At the beginning an attempt was made to filter the river water, but because of the then general feeling that such a work was impracticable, the experimental filter costs were severely limited and the somewhat crude affair resulting was a complete failure. However, the dye house was placed in operation and, while the discolored river water was used in an untreated form, it proved no very severe handicap because the shades dyed were sufficiently dark to overcome the water difficulty.

As clean water was an absolute necessity for light dyed shades and for bleaching, it was decided to drill some deep wells. This was done and water secured in amounts ranging from 15 to a little over 100 gallons a minute from each well, while the well depth varied all the way from 90 to 900 feet. While this work produced clean water in limited volume, it took a good deal of time and money, and after the wells were drilled the water must, perforce, be pumped. The scattered location of the wells over the property compelled a method of pumping with a central plant and thus the air lift system was installed and used for a number of years.

In the meantime, while this well drilling was in progress, and while those already in use were being pumped night and day to augment the water supply, the work done at the plant had proved so satisfactory that enlargements had become necessary. As a matter of fact an addition was built each year up to about 1900. But with the build-



Lanett Bleachery & Dye Works, Lanett, Ala., as it was in 1898. The second commercial finishing plant to be established in the South.

ing of additions and the accepting of outside work for finishing, that is work that did not originate in a plant controlled by Wellington, Sears & Co., the demand for water became so great that additional water supplies were necessary and, for a period, water was secured from the public supply of the city of West Point.

During the years that have intervened experiments at other plants have demonstrated that the suitable filtration of southern surface waters is commercially practicable and in 1923 a filter system was installed at the Lanett plant to entirely supercede the previous water supplies.

Arrangements are also being made at the present time to build extensive additions which will double the capacity of the present plant.

This brief djversion into the history of a single plant illustrates how the water supply question was successfully overcome under rather severe conditions and also points out the growth tendencies that have been everywhere evidnt in the finishing plants of this section.

Not all Southern plants were troubled by their water supply as was the case in the instance outlined. For example, take the plant at Clearwater, South Carolina. The soil in that general section is topped with sand and the clay subsoil is white, often with an admixture of sand. As a result, it was only necessary to build a retaining dam across the creek near the point selected for the site of this plant, and then pump the water directly into the machines.

This plant at Clearwater included in its equipment an aniline black dyeing outfit and two printing machines. This was probably the first effort to introduce machine printing into the South, and there is little doubt that this plant could have been continued on a commercially successful scale if the management had given more careful attention to the intangibles, and possibly some of the tangibles, that are so necessary to the ultimate success of any kind of a business. However, about 1907 or 1908 the machinery was sold and the buildings remodeled for a cotton mill which has since that time been successfully operated under a different management as the Seminole Mills.

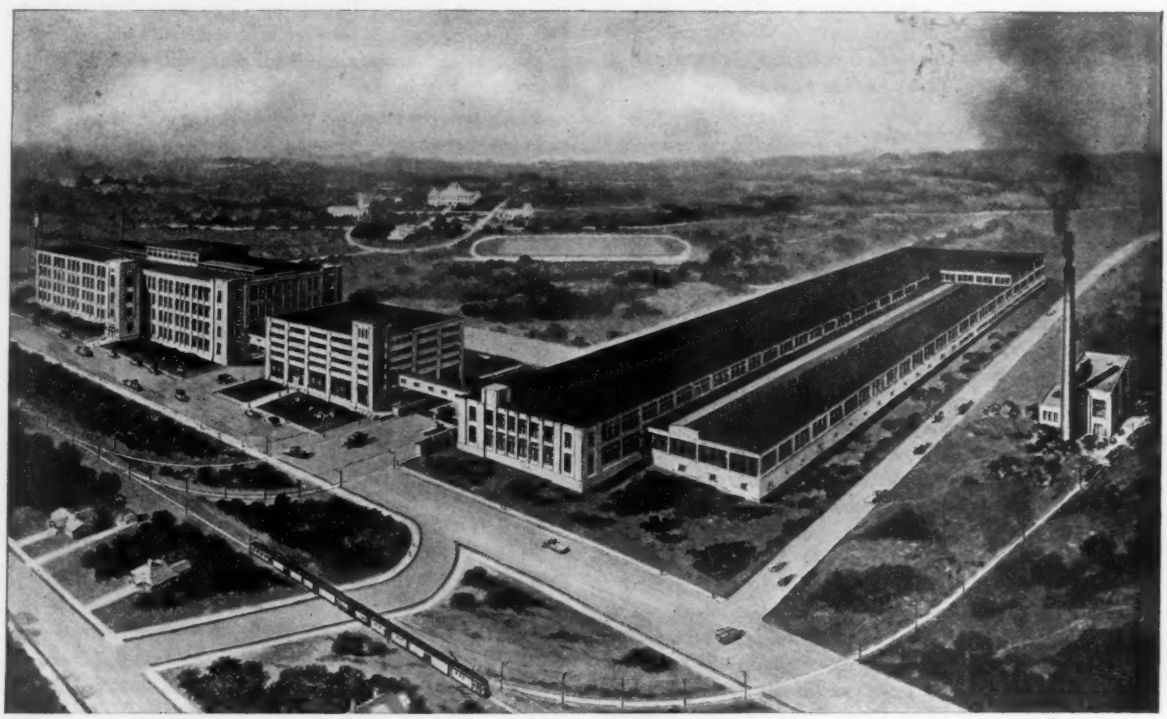
The Union Bleaching and Finishing Company at Greenville, South Carolina, which was the last of the early plants mentioned to be built, had water conditions somewhat similar to Lanett to overcome, but at this plant the filtering proposition was gone into with more thoroughness, and, too, they had before them the experiences of the others who had preceded them in the finishing field. This plant has

Lanett Bleachery & Dye Works, Lanett, Alabama, as it is today. Additions are now being made that will double the total capacity of this plant.

proved successful and has had a regular and healthy growth, having multiplied its initial capacity four times.

One of the feeders of southern finishing plants in the early days was the Bowen-Jewell Company, at Jewell, Georgia. This concern made bags. It also made some bag cloth. Just about the time the Clearwater plant was in the midst of its troubles, the Bowen-Jewell outfit secured a piece of property at Chickamauga, Georgia, on which were located two beautiful springs having a total daily flow of about 44 million gallons. On this property, about 1908-09, they built a bag mill and a finishing plant, and into this latter went some of the machinery from the Clearwater plant in addition to other and new equipment.

At the beginning of 1923 this plant had 22,000 spindles in its bag mill and a capacity of 145,000 yards a day in the finishing plant, and during that year plans were completed for an addition that will just about double its output.



An architect's perspective of the new Pacific Mills' Print Works development at Lyman, South Carolina. Construction work on this plant is now in progress, and a complete village of several hundred houses being rapidly completed.

It is not intended to recite here a history of each individual plant down through the years, but only to outline such spots and high lights as will give the reader a comprehensive idea of how the industry started and in what manner it progressed.

During the war period, 1914-18, when dyestuffs were at a premium and job finishing plants overloaded as to orders, many private or single plant finishing establishments were installed. This was especially true of knitting mills which were practically forced into the finishing of their own goods by circumstances over which they had no control.

But a quick glance at the chronology of the more important installations will show the steady increase in number and the upward trend in the different branches.

Following the starting of the Chickamauga plant about 1908-09, comes the Keystone Finishing Mills at Burlington, North Carolina, finishers of cotton piece goods, in 1910.

The Southern Mercerizing Company at Tryon, North Carolina, yarn mercerizers, 1911.

Standard Processing Company, Chattanooga, Tennessee, yarn mercerizers, 1912-13. This plant, it might be added in parenthesis, was intended to convert only the yarn from the Coosa plant of the same company, now the Standard-Coosa-Thatcher Co., but while the Coosa plant has grown immensely, and the Thatcher plant, of about the same size, has been built, the processing plant has kept ahead of the procession so that it not only is able to handle all the product from its own plants but also outside yarns from other mills.

Then comes the Proximity Print Works at Greensboro, North Carolina, in 1914, where bleaching, piece dyeing, machine printing and finishing are carried on. This was the second plant in the South to install printing machines, and be it understood that bag printing machines have not been referred to in these remarks about printing machinery. What is meant is the so-called "calico printing machines" of one or more colors. The present capacity of this plant is probably in excess of a million yards a week.

The Trinity Products Company at Dallas, Texas, who do yarn processing, come along in 1916 as Texas' first offering in the way of a separate or commercial plant.

The American Finishing Company at Memphis, which is a bag finishing mill, and the National Dye Works at Burlington, North Carolina, piece dyeing, were contribu-

tions of 1917. While in 1918-19 came the American Processing Company at Mount Holly, North Carolina, mercerizers of yarns, to be followed in 1919, 1920, and 1921 by the Dixie Mercerizing Company at Chattanooga, Tennessee, the Elmore Company at Spindale, North Carolina, and the Spinners' Processing Company, also at Spindale—all yarn mercerizers—in the years and order named.

Also, somewhere in this general period came the Spray Bleachery at Spray, North Carolina, and the North Carolina Finishing Company at Salisbury, North Carolina. The first a Marshall Field proposition, and the second controlled by the Erlangers of B. V. D. fame. Although their exact chronological place in the line is not at the moment available, it makes little difference for the purpose of this article. It is the general trend we are after rather than the individual installation.

This, after the war period, brought still other installations of both private and commercial plants, such as the private plant of the Riverside and Dan River Cotton Mills, and the commercial plant known as the Yates Bleachery Company at Flintstone, Georgia.

Then in May, 1922, General Lawrence D. Tyson, at that time president of the American Cotton Manufacturers' Association, in an address at Washington, voiced the urgent need for Southern mills to finish their products in the South. And as if his vision had been prophetic, the interest in this end of the industry has been increasing ever since. In fact, it had already begun to increase at that time as The Southern Franklin Process Company of Greenville, South Carolina, was incorporated in 1921 and the plant was completed in 1922. So successful was this plant that its capacity was doubled within the year.

The Lowell Bleachery South, at Griffin, Georgia, was started early in 1922 and put into operation about the middle of 1923. It is operated as a branch of the Lowell Bleachery at Lowell, Massachusetts, and St. Louis, Missouri, although it is a separate corporation controlled jointly by the Lowell Bleachery and the Kincaid Manufacturing Company, the latter company having headquarters in Griffin. The principal product is turkish towels.

Up in New England the name "Bannon" is a familiar one in finishing plant history. Now it happened that at one of the Bannon plants in Massachusetts there was being finished a good bit of southern cloth. A little investigation demonstrated that on much of this cloth freight was being paid from South Carolina to Massachusetts and later from Massachusetts to Richmond, Atlanta, St. Louis, and other distributing points in the South and West. Therefore the Bannons and Harry Stephenson, vice-president and general manager at the Lanett plant, got figuring together with the result that a million dollar bleachery and finishing plant is being built at Taylors, South Carolina. just outside of Greenville, to be known as the Southern Bleachery, Inc.

Ware Shoals, South Carolina, has for many years been the home of two mills controlled by Benjamin D. Riegel, of the Riegel Bag Company, up in New Jersey. Within the last year a large reinforced concrete building has been completed and equipped with machinery for bleaching and finishing bag goods and a complete bag making and printing equipment installed in the basement of one of the main mill buildings.

The acquisitions of Lockwood, Greene & Co., for the Pacific Mills have been too recent and too much talked of to need comment here, but it is interesting to note that the proprietors of the Pacific Print Works at Lawrence, Mass., the largest bleachery and print works in America, if not in the world, have acquired property on the Little Tyger river and are building a town near Spartanburg, South Carolina, to be called Lyman, where there will be immediately located a mill and a bleachery and finishing plant. A little later, as the properties develop, it is intended to install printing machines and what will probably become a 25-machine print works. The completed developments will approach a total of $7,000,000.

Scarcely had the sound of these announcements ceased echoing when the United States Finishing Company, another big Eastern finishing concern operating a string of plants in the New England section, announced its purchase of the Blue Springs Dyeing and Finishing Company at Cedartown, Georgia. Here enlargements and changes are in progress and another Southern plant will soon be ready to make its bow in the commercial field.

Then the Graniteville Manufacturing Company, with mills at Graniteville, Vaucluse and Warrenville, South Carolina, announced the letting of the contracts for a finishing plant and bleachery at Graniteville to prepare the products of these mills for the market. This plant will be ready for running early in 1924.

Almost simultaneous with the Graniteville announcement came word that the Thomaston Cotton Mills at Thomaston, Georgia, had begun work on a $500,000 bleaching and finishing development on Potato Creek, primarily to take care of the product of their own mills.

And finally, just as this article is being written, comes the announcement that the Bancrofts, veteran finishing plant people with headquarters at Wilmington, Delaware, have purchased 600 acres of land on Curtis Creek at Old Fort, North Carolina, near Asheville, and will erect thereon a village of 500 houses for the employees of a finishing plant of about 42 acres of floor space, to be built and operated as a southern branch of the main plant at Wilmington. Two dams, to impound the necessary water for processing, are to be built on Curtis Creek.

Then, to add further zest to the good things donated by 1923, within a week the Sayles Finishing Plants, Inc., of Rhode Island, with four large plants in that state, announced that they would erect at once on property already purchased on the Swannanoa River, four miles from Asheville, N. C., a two million dollar cotton bleaching and finishing plant with a modern village and all the necessities appertaining thereto.

Thus we see the lines on the chart of progress slowly but steadily moving upward as each year adds its increment. After those first five plants had blazed the way and eliminated some of the problems that had been classed as unconquerable, capital moved more freely into these channels. But it has been left for the last year of our quarter-century to add the crowning climax to the twenty-five years of steady advancement herein chronicled. If the progress of 1923 may be regarded as a criterion for the future, then the South may confidently look forward into the next quarter century for an advance in textile finishing development that will be equalled only by its present records in fabric manufacture.

Grandmother, How You Have Changed!

By W. T. Waters

FROM Knitting Needles and Nightcaps, from Red Riding Hoods and Red Flannels, to These New Times of Chiffon Hose and Artcraft Underwear and an Industry Employing Millions of Capital and Thousands of Workers, the South Has Kept Pace and Is Ready to Lead.

If we began at the beginning we should start at least with Tutankhamen, for they say they have found in his tomb some sort of a knitted cap or something. And probably the science of knitting was an ancient branch of knowledge even then. Nobody knows.

But this is not a story of the art itself. Rather it is an account of its growth into an industry in just one section of the world. What happened elsewhere, or when, is interesting here solely as it supplies the background against which can be discerned the growth of commercial knitting in the southern states alone. The fact that Henry II was tickled pink by a pair of silk stockings that somebody gave him, and that Queen Elizabeth, not to be outdone by a Frenchman, got herself a pair of silk ones a couple of years later, are just incidental except in the fact that both sovereigns stood out for nothing but silk, whereas nowadays all the queens have 'em.

From the time when William Lee invented his stocking frame and got run out of England on account of it, and then got run out of France in spite of it, along about 1589, till 1832, when "the principle of knitting by power was first successfully attained at Cohoes, N. Y., by Egbert Egberts," and the knit-goods industry came into existence as an industry in America, things had rocked along for hundreds and thousands of years without much change except a flock of patents. In 1810 a chap by the name of Tench Coxe had published "a Statement of the Arts and Manufactures of the United States of America" wherein he showed a year's domestic output to be worth about $572,742, all of which consisted of stockings, all knitted strictly at home in nine States and "Orleans Territory." The country's entire stock of machinery at that auspicious moment was 148 hand-power looms, of which there were two in Virginia (which was noted for the quality of its stockings), and 136 in Pennsylvania, and 10 in Maryland.

The 1849 United States Census, first to include manufactures, showed 85 establishments doing knitting in the whole United States. The work was an unimportant branch of wool manufactures, which in turn were a division of the primitive textile industry.

Seventy years later, in 1919, the knit-goods industry was manufacturing $713,139,689 worth of products in a year, on 172,363 power-driven knitting machines in 2,050 mills in 32 states.

All of which marked a rather big change from the days of no underwear at all, down through the Red Flannel Era to the present times when union suits are advertised by name, like battleships and Pullman cars, upon the pictured frames of unabashed youths who seem to be forever tying their shoes, or shaving, or lighting monogrammed cigarets. The American nation is the greatest wearer of under-clothing in the civilized world, the uncivilized not counting at all. Where would we be on that proud score, but for the knit-goods industry?

So it is a radical evolution also from the time when one's stockings were made of cloth and fastened to one's galluses at the waist, if one wore galluses, down to the time when hosiery is named too and even the women wear socks—or at least roll 'em. It might be hoped that the days of change are by no means ended yet, and that we may look forward to a turn in the cycle of fashion back to the call for pants and socks in one form-fitting garment, the same being knitted. Which would seem to call for a multitude of additional knitting machines, and more marks on the profit side of the books—at least until the unhappy thought intrudes that then one might as well do away with the battleship underwear already referred to.

Before 1850 knitted goods were chiefly the product of needles plied by hand. The Civil War came along and gave great impetus to organized knitting, to hand-power machine knitting, to fancy work. Thereafter the country passed through the disastrous times of fancy-striped hosiery, the laterally-striped stockings of red and blue and green. Those were the hideous days. Men not only had to see striped stockings when they looked at all; they had to wear red flannels to boot.

So we have come to the modern times when "the frame tender in an obscure little mill who longs for bigger and better things seldom realizes that he is doing as much knitting as fourteen thousand grandmothers." Which suggests a paraphrase on the story of the three workmen building the cathedral.

"What are you doing, my good man?" we have the interlocutor inquiring.

"Working for $14 a week," says the first workman.

"And you?"

"Knitting stockings," the second answers.

"And you?"

"Ah!" sighs the third. "I am dressing the limbs of a nation."

But let's get down to our own knitting.

Did it stick in your mind that our old friend Coxe, back yonder in 1810, named Virginia and Maryland among his three leading States in knitting? Well, he did. And we claim they are Southern States. That was beginning with the first of 'em.

Maryland has stuck on the roll, clear through. Virginia dropped off for a while, not making enough to be counted in the census; but Virginia came back in 1890. Of the 32 States now listed in the knit-goods industry, 11 are Southern.

The original establishments were small affairs. The whole industry was little. With a few dollars and a willing disposition, one might start a mill anywhere. One still may do that little thing; but the chances now are greater that the sheriff will do the closing thereof. The early managers knew little of costs and cared less. Rule-of-thumb methods were good enough. The surprising fact is that these primitive and pioneer days lasted until so recently. We have just now come clearly to the time when efficient management and efficient equipment and labor are receiving their just reward.

Maryland got all the mention that was awarded to the South by the census of 1849-50. It was stated that the value of products in Maryland for the year was $1,725. Missouri, a border state, produced $1,800 that year.

Ten years later, the census being completed just about the time Fort Sumter was fired on, Maryland had two knitting mills that produced $6,123 worth of goods on an invested capital of $1,050. Four male hands did the work. They were known as "hands" in those days! No women got in on the report at all. The two Maryland mills made 4,060 pairs of hose that year. Both were in Baltimore.

Missouri's two establishments, in the 1860 Census, showed $11,000 invested capital, 10 male "hands" and $14,880 value of product. Both were in St. Louis.

Kentucky showed for the first time that same year with three mills. One was in Jefferson county, two in Kenton county. They had $2,700 invested, four male "hands," $11,700 value of product, 2,500 dozen pairs of hose. Notice the "dozen." We were beginning to deal with big figures. Nightcaps were in big demand. There were no furnaces in those days, remember.

In 1870 Maryland had only one mill; Missouri had climbed to seven; and Kentucky had dropped out, not to reappear for 20 years. And there were no others in the whole South making as much as $500 worth of products a year. Eight total. That was all. In the rest of the country, 240 mills.

The Plant and Village of the Holston Manufacturing Company, Knoxville, Tennessee.

In 1880 we find Maryland still plugging along with one mill; Missouri back to four; West Virginia stepping into the spotlight for the first time, with one ($5,000 invested). And there the story ended again. Total, six.

In that year the whole United States had 359 mills, having climbed from 248 in ten years.

Things had begun to happen when the enumerators of the 1890 census took the field. Up to 1880 this work had been done more or less casually by United States deputy marshals, who were paid 15 cents for each "complete and satisfactory enumeration of an establishment of productive industry." Beginning with the 1880 Census, the government had taken manufactures somewhat more seriously. The thing was becoming important. Not only "hosiery and knitting," which was still an unimportant branch of wool manufactures. Everything.

By 1890, for one thing, mankind was beginning to move

out of wool underwear and into cotton—which meant volumes for the South. Wool shirts and drawers itched; and the darn things shrank too much. Cotton was not so warm, but warm enough. New dollars begin to head southward. So also did the knit-goods industry. That was the turning point.

But even as late as 1890 we find this official comment by the government: "The line of demarcation between factory and household manufacture often disappears. A number of large houses in the eastern states, who are described as manufacturers, possess no factory and employ no power. They buy yarns in large quantities, and give them out to women in nearby towns to be knitted at home."

In 1890 the South stood out with 37 mills, $796,755 invested capital, $1,153,959 value of products. There were 796 mills in the entire country, with an average capital of $63,578, producing $67,241,013 a year. The industry had come into its own elsewhere, but not yet in the South. It had begun to use vastly more cotton than wool. The tendency was in the direction of larger mills. The knitting industry was becoming important in the South, creating a market for soft yarns.

Maryland had 8 that year; Missouri, 7; Kentucky was back with two; West Virginia had two; Alabama appeared for the first time, with three; Georgia likewise, with four; Louisiana was another newcomer, with three; North Carolina arrived, with five mills; there was one in Florida; Virginia showed with two. Knitting in the South had begun.

As a real industry, however, the manufacture of knit-goods came into its own in the South at about the time that the first number of COTTON was revealed to a waiting world. There may have been no connection whatever between the two events. But they were significantly together in time.

In order to vary the monotony, let's swing away from the more serious side of things for a moment and say it with figures. Here they are, showing Southern growth from 1900 to 1919 inclusive:

NUMBER OF MILLS—U. S. CENSUS.

State	1900	1904	1909	1914	1919
United States	921	1079	1374	1622	2050
Alabama	1	8	6	5	10
Georgia	16	21	22	22	28
Maryland	4	4	11	10	7
North Carolina	24	40	62	74	121
South Carolina	6	14	7	6	14
Tennessee	4	16	22	26	63
Virginia	15	14	11	13	10
Missouri	2	1	2	..	..
West Virginia	2	2	2	1	1
Mississippi	1	2	1	1	1
Louisiana	1	1	1	3	3
Texas	1	..	1	..	..
Kentucky	..	1	2	1	2
TOTALS, SOUTH	77	124	150	162	260

When you were a little shaver, did your mother ever surprise you with a dose of castor oil?

But those figures weren't so hard to take, were they? They're nothing to what is held back. Some of these reserves may be divulged to you ere the evening is over, for that matter. Besides, all you are expected to do is read. You didn't have to dig them out of the census reports.

Dig them out is right! For if there is one big industry about which practically nothing has been published, except to tell the iniquities of cancellations and how to keep a knitting machine oiled, etc., it is this self-same manufacture of knit-goods, United States of America, and particularly Southern United States.

But let's slip along. In 1921, with the first of the biennial census reports on manufactures, Uncle Sam cut out all knitting mills whose annual value of product was less than $5,000. Until then the minimum limit had been $500. There were 169 mills making between $500 and $5,000 omitted from the 1921 Census. There had been 145 mills of that smaller size in the 1919 figures.

The 1921 report therefore shows a slight decrease: in the United States, 2,078 mills total; Alabama, 8; Georgia, 28; Maryland, 8; North Carolina, 109; South Carolina, 12; Tennessee, 66; Virginia, 9; West Virginia, 2; Mississippi, 1; Louisiana, 3; Kentucky, 4: total for the South, 250.

Then along came Davison's Directory for 1922 and raised the ante all down the line, by including all mills of any size: Alabama, 13; Georgia, 34; Maryland, 11; North Carolina, 160; South Carolina, 15; Tennessee, 77; Virginia, 16; Missouri, 6; West Virginia, 4; Mississippi, 1; Louisiana, 3; Texas, 2; Kentucky, 6; Florida, 1; total for the South, 349, all sizes.

Two facts stick out from all the foregoing information: first, North Carolina has more mills than any other Southern state; and second, the rate of growth in the South has been greater than for the country as a whole. The South started out 23 years ago with considerably less than one-tenth of the United States total; now it has considerably more than that tenth.

Incidentally, only two other states in the country have more mills than North Carolina. They are New York and Pennsylvania, with 710 and 614 respectively. Mills are as thick in those two states as flies around the syrup-barrel spigot. We Southerners look with horror and aversion on such congestion.

But there are other things to be considered than mere number of mills. Oh, certainly. Knitting machines, for instance. Let's give the old figures the once-over again.

KNITTING MACHINES IN LEADING SOUTHERN STATES—U. S. CENSUS.

	1900	1904	1909	1914	1919
United States	69,047	88,374	115,019	142,240	172,363
Alabama	300	499	429	635	1,257
Georgia	1,078	1,677	3,530	4,699	5,834
Maryland	612	814	1,021	1,255	1,066
North Carolina	1,354	3,043	6,395	10,959	14,234
South Carolina	785	1,678	1,375	1,015	1,985
Tennessee	581	1,787	3,929	6,749	12,986
Virginia	993	1,310	1,304	1,678	2,043
TOTALS, SOUTH	5,703	10,808	17,983	26,990	39,405

Not even an apology, that time. We are beginning to see that these figure-tables have some meat to them. Besides, think again of the fellow who had to dig 'em out and add 'em.

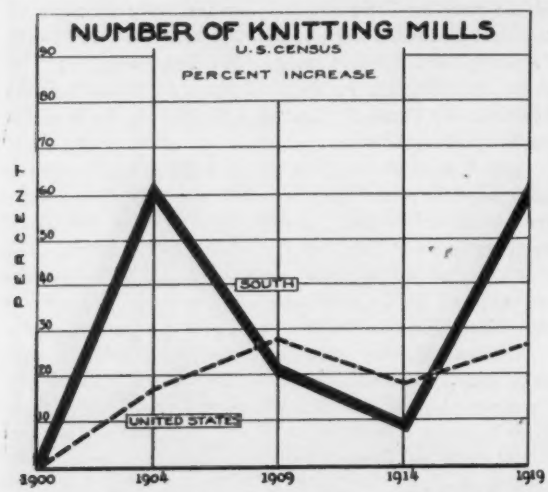
North Carolina again sticks out like a sore thumb, with the big number; but look how Tennessee is coming up. And again the total shows the South gathering speed over the pace set by the country as a whole. Starting with less than a tenth in 1900, the South in 1919 had over 23 per cent of all knitting machines in the country. In 1870 there had been 33 machines in the whole South; in 1890, 1,087 machines; in 1898, according to Davison's, 4,481 knitting machines and 555 mill sewing machines. In 1919, said the census, 39,405.

Southern knitting machines grew more than seven times over, in the period 1900-1919, while those of the country as a whole were growing less than three times. The actual

increase in all states was 103,316 machines of which the seven southern states (sounds like a hair-tonic, doesn't it?) supplied 33,702 without counting Kentucky, Louisiana, Mississippi and West Virginia, which had seven mills among them that were not detailed separately.

Not revealed anywhere in the foregoing, and now divulged for the first time herein, are these facts: North Carolina ranked third among all states in 1914 and 1919, being exceeded only by Pennsylvania and New York, with New York not having so much of a lead at that. In 1914 only four states (these three and Massachusetts) had over 10,000 machines apiece. Further, Tennessee stood sixth in 1914 and fourth in 1919.

Davison's for 1923 shows 49,674 knitting machines in the South, divided into 47,911 hosiery and 1,763 under-



wear; also 15,145 ribbers, 5,439 sewing machines, and 7,541 loopers. Which is piling Etna on Pelion, as the fellow says, by adding over 8,000 knitting machines in four years.

Still another thing to go by is "annual value of product."

In 1921 the mills of the seven leading Southern States turned out a total product valued at $66,786,394, without counting the four other states. The total for the whole country was $634,073,895. Notice that! More than a tenth, again!

Tennessee led among the Southerners that year with $24,703,782 value of product, standing fifth in the United States. New Jersey was sixth, and then North Carolina, with $23,448,001.

Again, there is a figure called "value added by manufacture." The southern (seven states) total for 1921 was $27,358,765; the United States total was $273,616,062. Right on that tenth!

North Carolina led—$11,595,383. Tennessee was second with $8,355,665. North Carolina was sixth in the country, and Tennessee was eighth.

Getting tired of figures? Well, so are the rest of us. Let's boil it down.

In value of all hosiery, Tennessee led among the Southern States and was third in the country, with $20,634,782.

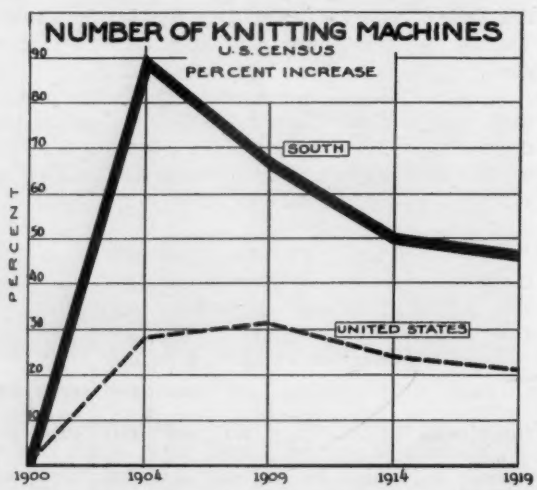
But in quantity of hosiery North Carolina led, with 11,666,171 dozen pairs, standing second after Pennsylvania on that point.

The Southern total on value of hosiery was $51,815,052; on quantity, 28,881,838 dozen pairs. The country's totals were $290,488,560 and 80,240,936 dozens. On the point of value of hosiery produced, the South turned out a little better than a sixth produced by all states together; and on quantity, more than one-third.

Only two Southern States produced enough woven shirts and drawers to be counted, in 1921. They were North Carolina, with $912,740 value and 171,302 dozens (standing sixth in the United States on both counts) and Virginia with $743,463 value and 160,566 dozens. The rest of the country skinned us alive, there. But this part of the industry is just catching its stride, in the South.

There are lots of other cross-sections and analyses to be made of the knitting industry in the South as it stands today. But that is not entirely the purpose of this narrative, which is concerned rather with the real development of the industry through the past quarter of a century to the point where it stands today in the South, on the threshold of real growth. There are mild editorial reservations as to statistics, which are permissible and to be accepted gracefully but not to be too heartily encouraged.

Therefore the other stories of things to be discerned through an average of value of product per mill and another average of value added by manufacture per mill must be foregone while we hasten along to other more immediate affairs. The thrills to be derived from a study



of the wage-earners, their average number and wages per mill North and South; their average value added by manufacture per wage-earner; their ditto per dollar paid in wages, and other similar conditions and circumstances, are to be denied us, at least for the nonce.

Times have changed since the editorial personage who directs the affairs of COTTON found himself hunting a mill in a certain Southern State and finally located it, after riding miles in a buggy and then walking the rest of the way through the mud, in an old barn in the middle of a soggy field. That mill grew up, like dozens of others that survived, and is prospering today. Times have changed since a circulation representative of COTTON ran a mill to earth, up East, by trailing it to the rear of a two-story building, climbing a fire-escape, entering by a rear window —and found three necktie machines busily at work.

They have changed for the better; but there was a romance about the earlier days. Something adventuresome. Big possibilities. Nothing so commercial as the tendency

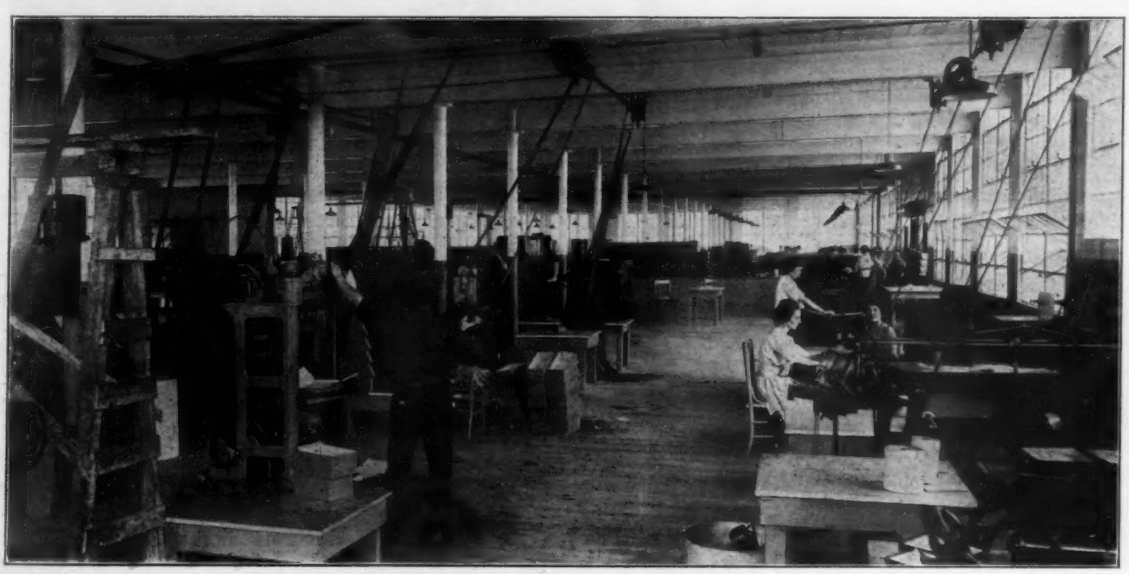
The Knitting Room at the Holston Manufacturing Company.

now is. Those were the times like pioneer days in America, when a baby born in the wilderness might survive the Indians and catamounts and measles and colic and eventually grow up to build a cabin of his own.

And again we return to the impressive thought that those pioneer days in the South were ending just so recently. Twenty-five years ago things had just started to change.

Let some of the old-timers tell it.

Here is one who started in 1893 in North Carolina, in a small storeroom in a little town. His equipment was thirty-six 108-needle knitting machines. He hired about 30 hands. He bought all his yarn from eastern spinners. He shipped his product to Philadelphia, in large locked bags, to be dyed there and shipped back to him. Then a German dyer wandered into town and "took in" dyeing. A few years later this manufacturer had his own dyehouse with the German in charge. A couple of years more, and the company moved into its new mill. At this time it had 300 machines, 150 employees, gross sales $160,000. A couple more years, and spinning equipment was added; also a box shop; also a print shop. Another year or two and a few ring spindles were added. Then a second, additional, mill was started. A year or two, and a little mill in another town was purchased. Today this mill has over 4,000 knitting machines, over 85,000 spindles, consists of fifteen separate unit mills, has a daily capacity of 25,000 dozen pairs of hosiery, and keeps whole villages of employees



Box Making Machinery and Packing Room, Holston Manufacturing Company.

busy. A book could be written about it.

This mill started, in 1921, the first full-fashioned silk hosiery installation south of the Smith and Wesson line.

In this current year (1923) three other southern mills have bought full-fashioned knitting machines.

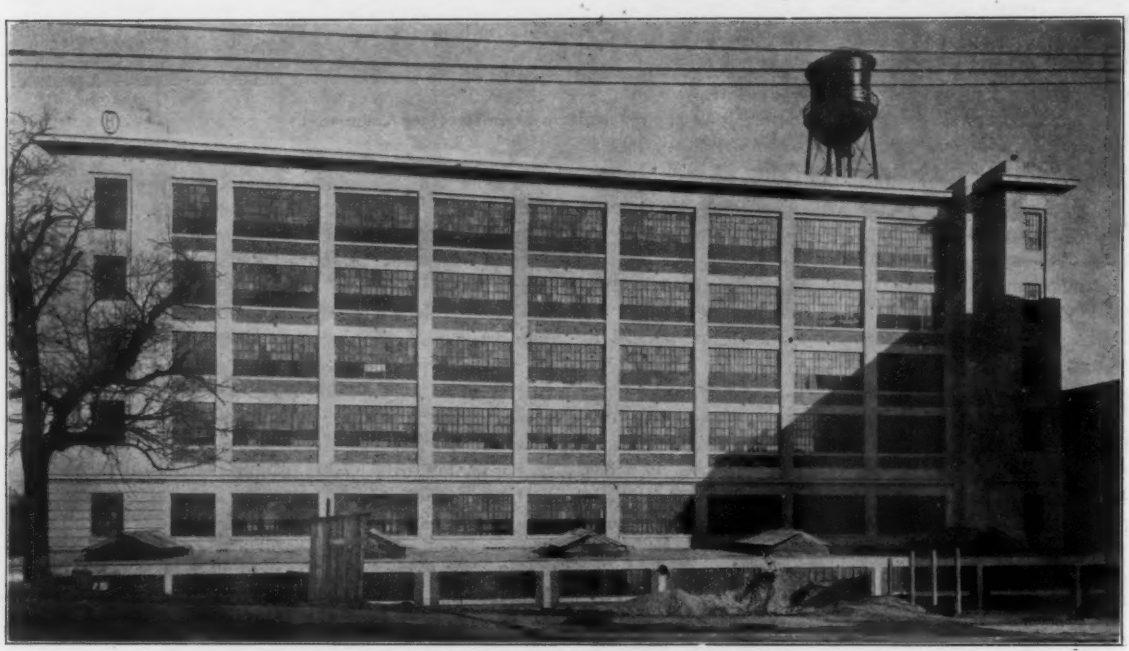
"This is the start," one authority remarks laconically. "Heretofore all full-fashioned knitting has been done around Philadelphia."

Here is another significant fact about the mill we have been describing: without exception, every manager of any mill or department in this Southern organization has been brought up and trained within the organization itself. A generation of skilled knitters has grown up in the South. "Southern mill operatives as well as owners have learned to take pride in their work and quality."

Let's take another—an underwear mill, which started in western North Carolina in 1902 with 25 knitting machines. Today this mill is operating nearly 300 machines, and in addition is making its own yarn on 28,000 spindles. The story of its development meanwhile is one of steady growth and constant expansion.

Here is another; one of the old originals; a hosiery mill in East Tennessee, chartered in 1893, whose product today bears one of the best known trade-marks in the industry and is sold all over the world. This mill was one of the pioneers in the manufacture of seamless hosiery in the South. It started with the old type of knitting machines turned by hand, on 84 and 108-needle gray mixed goods. It was reorganized in 1903, and at that time had discarded its old machinery and had 50 full automatic knitting machines in operation, together with complete finishing and dyeing equipment. The capacity was doubled soon after that, the mill meanwhile having turned to 176-needle and 200-needle half hose equipment. In 1908 its capital stock was increased to $100,000 and it began to manufacture a higher grade of hosiery. The mill now is making a complete line of hosiery for all members of the family, using all materials.

Still another old-timer was started in Tennessee in 1896, in a little store building, with eight knitting machines (84 and 108-needle) and a capacity of about 80 dozen pairs of coarse work-socks per day. Today this concern operates six hosiery mills with over 1,000 machines keeping 1,700 people busy, and has a production of practically 7,000 dozen pairs per day. The headquarters mill of this organization now is located below the Georgia line. The concern today is a $3,000,000 corporation, as contrasted with its beginning with $4,500 capital; and is still under the same management with which it started nearly 30 years ago. Its officers and directors are large growers of cotton. The mill spins its own yarns and operates its own dye plant. The weekly payroll is more than $25,000; the first week it was $14. Total sales for 1897 were $14,505; for 1922, $4,548,540. The mill's two trade-marked brands are sold throughout this country and are largely exported. In 27 years of operation the company has paid to its stockholders, in cash and stock dividends, a total of $1,030,523, representing an average annual return of 10 per cent.

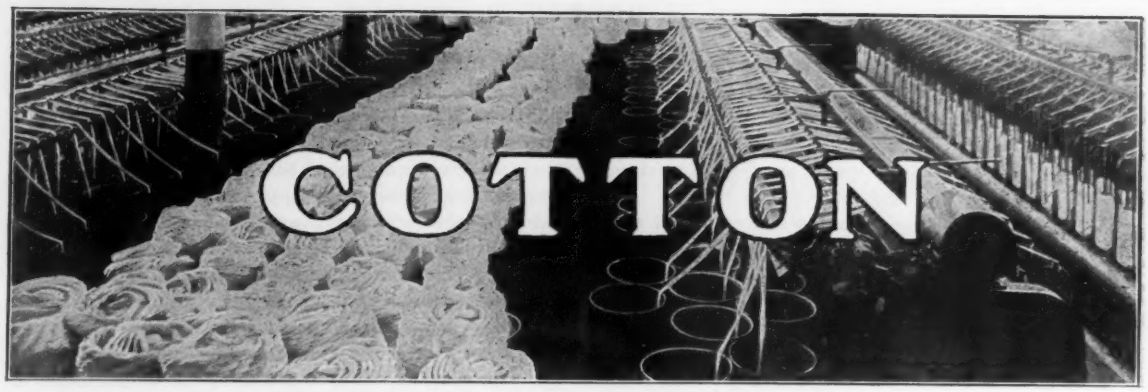


Knitting Plant of the P. H. Hanes Knitting Company, Winston-Salem, N. C.

We might run on almost indefinitely, but the story would remain the same; always the little start, the long and perilous years of hard work and steady growth, the development into an established institution.

That is typical of knitting in the South. Just as Grandmother's knitting needles in the days of the colonies clicked steadily all day long in a thousand pioneer homes scattered from Virginia to the Cherokee Nation and from tide-water to back o' the mountains, and Virginia stockings were known as the best and commanded highest prices everywhere, so today the needles are clicking busily throughout the South while an industry grows into permanence and high quality about us.

Indeed, Grandmother has changed.



January, Nineteen-Twenty-Four

Need for Closer Parity Between Spots and Futures.

The machinery built up during the last hundred years for the marketing and distributing of cotton is perhaps the most perfect and economical of the kind in the world. Yet, like all things mundane, it is not absolutely perfect. No doubt it contains many defects which are correctable. And, judging from the good effects flowing from the Lever Act of 1914, some of the remaining defects can be best corrected, probably, through the application of Federal laws.

There constantly is much agitation for additional laws on the subject. Some of this, like the frequently put forth proposal for abolishing the big exchanges and forbidding "speculation," is extremely radical and absurd. But there is agitation for changes or reforms even among the most conservative of the elements making up the big world of cotton.

Recently the Federal Trade Commission, acting on instructions from the United States Senate, held hearings on several proposals which come from thoroughly sane quarters. These have to do with the nature of the contracts under which cotton now is sold through the exchanges, especially the one in New York, for future delivery. It is proposed that there be enacted Federal laws which will make cotton deliverable under a futures contract tenderable at points other than New York and possibly New Orleans, the two now legally designated futures markets.

Two other proposed changes also were discussed. One involves the question of differentials for transportation and handling margins of cost in case the first noted change is made. The other would decrease or increase the number of grades, now limited to ten, which would be tenderable on a futures contract. On these last two proposals there was not much difference of opinion among those who took part in the hearing. Most of them appeared to believe that the present arrangement as to grades is all right. The differential, according to some, would follow if the markets in which cotton tenderable on futures are increased from five to ten as proposed. However, some who favor this latter change opposed the establishment of differentials.

The hearing dealt chiefly with the old, old question long known as that of southern warehouse delivery. It has broadened somewhat since it first came forward a quarter of a century or more ago. Those favoring it seem of the opinion that these new markets should not be confined altogether to southern ports or interior points but also ought to include one in New England, probably at New Bedford.

This question has been debated since New York began notably to decline as a spot cotton market, though maintaining its dominancy over trading in cotton futures. Several times early in the present century committees which investigated the subject for the New York Cotton Exchange recommended that the futures contract permit of cotton being tendered for delivery at points other than New York. The reasons for the change as given then are substantially the ones advanced by its advocates now. The prime one was and is that such an arrangement would check and narrow the widening divorce between spot and future cotton, bring about greater parity between price for the two, and thus serve the cause of stabilization.

While in the futures market from 15 to 20 bales of cotton is traded in for every one that exists, every futures contract, it was emphasized by all taking part in the hearing, rests on real cotton and relates directly to spots either at the present or some future time. But the bulk of these contracts are made on the New York Cotton Exchange, and contemplate delivery, insofar as that is contemplated at all, in New York. When New York was the dominant spot as well as futures market and nearly all cotton flowed out of the South this appears to have been very well. Generally there was a sufficiency of cotton on hand there to meet any reasonable demand for real cotton arising on account of the maturing of futures contracts. But as trading in spots has concentrated more and more at southern points, delivery in New York on futures contracts has become more difficult and uncertain and undesirable. This, some say, accounts for the frequent occurrence of what are known as "squeezes," when demand for cotton for New York delivery exceeds the supply and thus causes price quotations there for spots or near-months to fluctuate unduly and out of ratio to other quotations fixed more fully by the law of general supply and demand.

This condition, it is contended, reduces the protective or hedging value of futures, which is the principal worth of this blend of speculation and legitimate trading. For this value depends upon one reacting to the same influences which govern the other, which now quite frequently fails to happen, thus reducing the worth of the hedge as insurance to the spinner or legitimate trader who uses it to

avoid rather than to engage in gambling operations.

Hence most of the spinners who took part in the hearing advocated the proposed change; as did several cotton merchants and brokers. Some merchants and brokers opposed it, as did at least one spokesman for the producers. The exchanges were divided.

Opposition is based on the claim that to permit cotton to be tenderable in several different markets may permit big operators to manipulate deliveries so as to have a radically bearish effect on prices. It also, they said, would work against the small dealer, by making it possible for a single delivery to be tendered in a half dozen markets or more and so confuse these deliveries as to make it difficult for the small dealer to handle them. Some even went so far as to say that the change might break down the New York futures market, on account of the confusion which would result.

It was made clear, however, that under present conditions the market for futures grows more and more artificial and more and more detached from actual trades in real cotton. This naturally enhances the speculative factor and gives to those who buy or sell futures for protection against fluctuations less assurance that the futures they deal in will react in keeping with changes in spots.

That this will not be overcome entirely by eliminating the possibility of "squeezes" occurring in the New York market is very probable. At least one participant in the conference maintained that fully as much relief could be obtained through extending the delivery period on occasions when disparities between spots and futures go beyond what clearly is normal. This, he said, would give those who are caught short on maturing contracts plenty of time to bring the needed cotton into New York.

The singularity of the present situation was illustrated by facts presented as to the small amount of cotton frequently available in New York for the fulfillment of futures contracts. Several times within the last year, it was asserted, there were only a few hundred certificated bales in all New York for this purpose, though millions of bales were being sold and bought on contracts calling for delivery there.

The Federal Trade Commission has been making a thorough inquiry into the subject for Congress, which probably will consider additional legislation relating to this highly technical phase of cotton marketing.

What Congress will do is problematical—beyond, of course, giving the subject talkative treatment. It is a very intricate problem. While argument appears to favor the change as to tenderable deliveries, which is advocated by many of the ablest men in all branches of the cotton trades, no one can say positively how it will affect the delicate and complicated machinery through which cotton is marketed. When proposed there was more pronounced opposition to the limiting of grades tenderable under futures contracts, a change which virtually all now admit has worked helpfully for all concerned. And its great help has been through checking the gulf that has tended to develop between spot cotton and cotton futures—that is, between the reality and the symbol, the substance and the shadow. A change as to points of tenderable delivery, thus making virtually all warehoused cotton anywhere available for the fulfillment of futures contracts attaining maturity, might have even more beneficial effect.

Other People's Children.

Miss Grace Abbott, chief of the United States Children's Bureau, and others are much exercised concerning the country's human "seed corn." It is in danger, they say, of being destroyed or sapped of virility by what they call child labor. To preserve this human "seed corn," they declare, calls for amending the Federal Constitution so as to bring children, along with boll weevils and bootleggers, safely and completely under the jurisdiction of the National Government. This is because the Supreme Court has held on two occasions that Congress doesn't possess the power to send inspectors from Massachusetts into homes in South Carolina, or vice versa, to lay down rules governing the relation of parent to child.

The Federal Government already has taken jurisdiction over the child before it is born and this generally is exercised through persons who have little prospect or intent of ever producing children of their own. Some of these persons now would have this jurisdiction extended even to the twenty-first birthday of every person in the country. None would make the age limit less than eighteen years. And jurisdiction would be taken over Johnny, whose "labor" consists of bringing in the farm cattle or chopping the rural household's wood, and over Mary, who makes up her bed or washes the family dishes, just as completely as over the pathetic "tiny tots"—no longer, by the way, to be found—who are supposed to work for money in mines and factories.

One properly may wonder what "seed corn" contributions the run of the persons who are taking the lead in this astounding proposal have made to the country's human stock. Among the women it is not unchivalrous to note the frequency of the salutation "Miss," which presumes none. Of course many excellent mothers are marshalled in the several organizations which supposedly are behind the proposal, but it is doubtful if one in a hundred of them have given three serious thoughts to the subject or made any effort to acquaint themselves with the facts. They merely accept the exaggerations and sentimentalities put forth by "leaders" in the movement.

The anguish of the run of these leaders seems to bear chiefly on the "seed corn" others are providing—that is to say, their copious tears are shed over other people's children. And, as every parent knows, nobody can handle children so well as those who have none! For all time, the world has been filled with persons, notably childless ones, who yearned for authority over other people's progeny. When these get what they are now demanding, wise Misses of uncertain age and doleful Misters of uncertain sex will be free to go virtually as far as they like—with *your* children. Then, the parent will not be free to dismiss with scorn the worst of busybodies—those who try to tell you how to raise your children. Then, with the Federal Constitution behind them, they can appeal to the Federal police, which, for this purpose, will be made up largely of their own kind.

That is what treating the facts of life sentimentally and muckrackishly has brought us to. The country still is wailing and weeping over the cotton mill child, of the kind which the muckrackers of fifteen and twenty years ago created and thrust upon a sentimental public. That weazened "tot" who went to work in the dark and was driven

through a twelve-hour day by a cruel overseer was mostly a creation of warped sentimentalism and sensation then. It is now non-existent. Figures presented in behalf of the proposed child labor amendment show that comparatively few children are now employed in manufacturing industries of any kind. Throughout the country in 1920 there were so employed only 185,000 persons who were rated technically as children—that is, who were under 16 years old. Of these only a few more than 9,000 were under 14 years old. Succinctly, the bulk of them were beyond the age when nearly every successful man of the day boasts of having worked—reluctantly perhaps, but yet hard and beneficially. Moreover, in the last census findings the textile industries made excellent showing. The record of those in the South is virtually the best of all, showing practically no real child labor in the mills of this section. And yet nine out of ten persons who are for the proposed amendment will tell you that they are for it solely to keep little children out of the mills of the South! Of the one million children workers pointed to so sadly in behalf of the amendment, scarcely a handful are working in cotton mills anywhere. This is the result of great progress in this matter by reason of State legislation, the policies of employers, the silent force of machinery, and numerous other factors.

Virtually in every state where there is need for them there already are child labor laws as strong as those which Congress twice enacted and were twice declared unconstitutional by the Supreme Court. These laws vary, perhaps more than they should, but if such laws square with facts it is necessary that they be adapted to varying conditions. This can be done only if the subject is left to the states as in the past. To say that national legislation is needed, for example, because the laws of Montana relating to the employment of children in mines are much below the standard requirements Congress sought to fix for the country as a whole, is merely to contend for the ridiculous. For in Montana no children whatever are employed in mines!

In truth, the industrial or even the urban child labor problem, identifying it with the working of children, has virtually ceased to be, as the figures of the last census show. This the agitators for a Federal amendment practically admit, though for policy's sake they still talk in terms of conditions which no longer exist and peg their agitations on exaggerated individual cases which they dare not assert are typical.

What they are reaching out for chiefly is bureaucratic control of about the last and only unregulated refuge of truly joyful childhood, the rural household. For of the "one million working children"—profitably employed persons under sixteen—disclosed by the census in 1920, 61 per cent were on farms. And some 86 per cent of these were on home farms and merely shared in the manifold duties of the rural household.

Thus it is the home child, particularly the farm home child, which constitute the greatest proportion of the "one million child workers" over whom there is so much weeping, and for whom there is such clamoring for a Constitutional amendment. There probably are farm children who are worked unduly hard and under conditions not always the best for them, as in the case perhaps of migratory workers in the beet fields of the West and on truck farms in the East. But these in the main are of low grade immigrant stock and are by no means so numerous as to call for the extension of bureaucracy which the extremists are demanding. Even on the farms of the country the working of children decreased 50 per cent between the census taking of 1910 and that of 1920.

To say that this delicate phase of life, of all but sacred family life, shall be turned over to the management of a Washington bureau is practically to insult every parent who is doing a parent's duty to the race and to the country.

Yet this is what the proposed child labor amendment to the Federal Constitution would permit; that is, it would authorize Congress to clothe a bureau with the right to say what minors shall do in or about the home as well as in places like mines and factories. Experience proves that whatever Congress is empowered to do, along lines of this kind, ultimately is done. The busybodies who never let up see to that, while the run of folk are attending carefully to their own affairs.

INTANGIBLES IN MANUFACTURING

A Series by

Frederick H. McDonald.

LABOR POLICIES.

Labor is purchased help. We oftentimes aid it in being a hindrance.

We do not always remember that at one time we, ourselves, were just starting out with a lot of ambition and the hope of getting somewhere in life.

The other felow probably feels the same way. But we have now forgotten just how it felt.

If wages can be made to increase with increased effort—there will be more production at less cost. Nobody is going to work harder than he has to if he is not going to get more out of it.

Add to this the giving of increased opportunity by the development and training of those of your forces who respond to it, and you will have help that is a HELP.

Shower-baths, lockers, hospitals, schools, churches, swimming pools, theatres—all these, and more, will be failures in the face of a labor policy that does not grant a man a square deal.

A square deal is fairness of pay, opportunity, and treatment.

It costs less than a lot of sop in the shape of compensatory so-called welfare work that is often nothing more than the veiled expression of a bad conscience.

At least the employees are apt to so regard such welfare work when other conditions are not right.

Which does not mean that intelligent welfare work cannot be made a logical part of a real square deal!

Improvements in Cotton Handling

An Unusual Cotton Bale Conveying System at the Champion Compress, Wilmington, North Carolina

BY D. T. LAYLIN

The handling of baled cotton has for many years appealed to the manufacturers of monorail equipment as an ideal problem but cheap negro labor has, until the World War period, almost kept conveying apparatus of any sort out of the cotton compress and warehouse. Following the war, conditions having materially changed, with higher wages, shortage of labor and shorter hours, both the possible purchaser and the manufacturer now see real economies possible with handling machinery and are cooperating more closely than ever before. The exodus of the negro to the competitive labor markets of the North is, in fact, forcing the situation and compelling the immediate attention of the material handling industry.

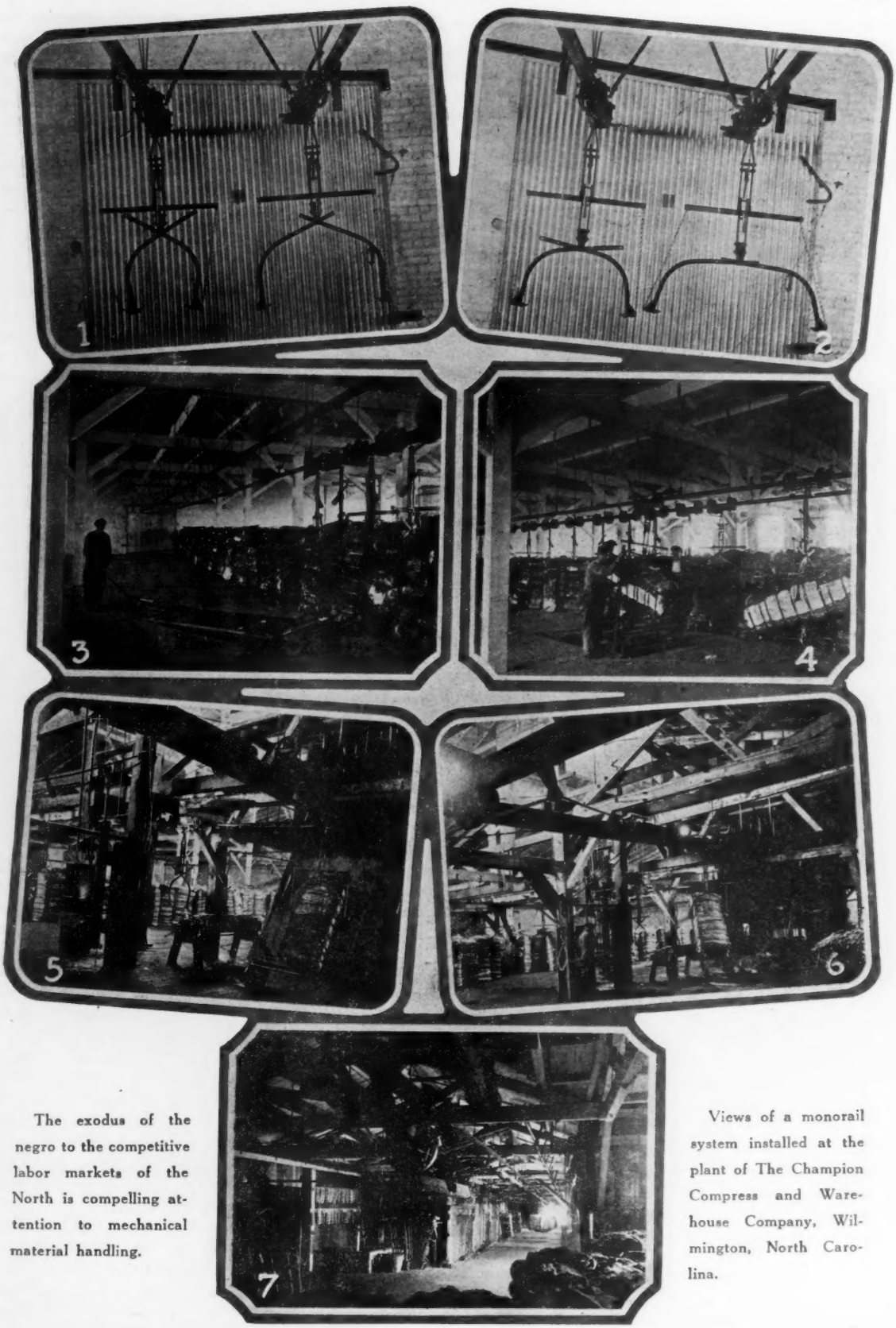
Recognizing that cotton bales inevitably would be handled by machinery, James C. Stewart, chief engineer for Alexander Sprunt and Sons, Wilmington, North Carolina, has for years given this subject intensive study so that when additional warehouse facilities were constructed at The Champion Compress and Warehouse Company's compress, provision was made in the building design to carry the additional load of a monorail system. The new warehouse, of heavy, slow burning mill construction, is two stories in height, eight hundred feet long and about one hundred feet wide. Situated to secure splendid dockage for ocean going boats on the Cape Fear River, the warehouse is separated from the compress proper by a sixty-foot street. Soil and wharf conditions as well as the desire to secure car level elevation for the lower floor made it advisable to elevate this first floor some forty-eight inches higher than the floors of the compress group of buildings. To meet the handling demands of three different floor levels, long travels, and bale travel in both directions necessitated extreme care in the selection of a handling system.

After an exhaustive preliminary study of the conditions to be met, The Cleveland Crane and Engineering Company, of Wickliffe, Ohio, through its Cleveland Electric Tramrail Division, undertook the development of a semi-automatic monorail system using tramrail trackage as the basis for this work. The system, which has now been completed and in operation several months, embraces about 3,500 feet of trackage with several rather unusual special features which are worthy of detailed description.

As a starting point, a bale grab was developed which by the changing of a single, simple adjustment, could handle either the high density bale of 24 inch width or the soft country bale varying from 38 to 54 inches wide. While it was comparatively simple to work out such a grab to carry the bales of varying widths, the tripping or releasing of the bales in a positive, clean cut manner was entirely another consideration. The grab finally developed, shown in Fig. 1, "set," and Fig. 2 "tripped," met all conditions most satisfactorily, not only holding the bales firmly under the swing and impact of sudden change of direction, but also tripping easily, without jar to the trackage and dropping the bale in an advantageous position for handling with the standard two-wheeled cotton truck.

The Old Method of Handling and Weighing Cotton.

It might not be amiss at this point to mention that it was found advisable not to attempt to cover the entire warehouse area with rail but instead, to depend upon a small two- or three-man trucking gang, to carry back the bales from the main runs on the ordinary two-wheeled bale truck. This introduced trucking hauls of not to exceed 50



The exodus of the negro to the competitive labor markets of the North is compelling attention to mechanical material handling.

Views of a monorail system installed at the plant of The Champion Compress and Warehouse Company, Wilmington, North Carolina.

feet as against possible hauls of 800 feet, partially on a grade, had the tramrail method not been used.

As stated early in the article, bale travel occurred in both directions, the high density bale being brought from the compress to the warehouse for storage, and in the rush season, country bales going direct from the cars to the warehouse for storage until more time was available for repressing.

A second problem, almost equally important with the grab, was the finding of a means for elevating the bales stored in the warehouse so they might be hooked with sufficient clearance from the floor for proper handling. Of primary importance was the installation of the trackage at a fixed, predetermined distance above the floor. This distance, largely determined by the fire door openings through which the trackage passed, is approximately eight feet. Based on the eight-foot head room, a related dimension of 56 inches was selected for the grab hooks spacing below the rail when suspended on a trolley (each grab, suitable for a single bale, had its individual trolley). This left a distance of 40 inches between the grab hooks and the floor to be used as a basis for hooking the bales. After several devices had been built and tried out, it was found that a platform 48 inches wide by 10 feet long, hinged at one end and hand elevated with a toggle mechanism, offered the most satisfactory working scheme. The platform finally evolved, shown in Figs. 3 and 4, is readily portable on its own adjustable wheels, can be used either parallel beneath, or at right angles to, the rail. The bale is wheeled with the two-wheeled truck, to the raising end of the platform in the "down" position, a second operator, elevates the platform with a ratchet lever, raising the truck, bale and trucker about seven inches. The grab is then hooked to the bale, the platform dropped by means of a foot operated band brake, and the bale left suspended from the grab and trolley, clearing the floor about 9 inches. One man and the trucker can work the outfit satisfactorily but a second man, to help hook, bring up the empty grabs and start the bales on their way, makes a much faster working outfit.

The primary duty of the system is, however, the transportation of the high density bales from the compress to the warehouse and the return of the empty grabs and carriers in a closed circuit making the operation a continuous one. Outside of mentioning that all parts of the system, such as the trackage, switches, elevators and power drives, are laid out on the basis of the return circuit idea, the most logical method of describing will be to follow the bale in its passage from the press to the warehouse.

Starting at the Webb Compress equipped with raising, safety doors to protect the men doing the banding, the bale is pulled from the platen of the press so that it drops to the raising door. This door, strongly reinforced, in the regular sequence of operations, tilts the bale to an inclined position as shown in Fig. 5, giving it the proper height for hooking. The door, in lowering, leaves the bale properly suspended on the track just at the end of the "lift beam." This lift beam is exactly what the name implies, a hinged, mechanically operated, steam driven device, constituting a part of the trackage in its normal or horizontal position. With the bale held in position by a safety fork, the end of the beam is (Fig. 6) elevated, creating an artificial gravity pitch in the track and at the same time releasing at the top of the rise, the fork holding the bale carrier. The carrier, rolling down the 20-foot incline, created by the lift beam, acquires sufficient velocity to carry it a horizontal run of 75 feet, around a 48-inch radius curve and onto the main trackage. At the terminus of the curve (see Fig. 7), a latch hinged to the side of the carrier or trolley engages a power driven cable equipped with "flights" and operating in a trough parallel to the rail. This power section of trackage is 250 feet long, the gap wheels carrying the cable at the ends being set at a pitch to the horizontal, permitting a rise of approximately 60 inches in the total travel of 250 feet. The return side of the cable is likewise utilized for bringing back the empty trolleys or soft bales by being paralleled by trackage but with the gravity pitch in the opposite direction. The 60-inch rise creates a fixed gravity pitch at the take-off of the power drive sufficient to propel the carriers to the next point of special operation.

After the trackage was installed with lift beam, power drive, and accessories connecting to the Webb compress, heretofore mentioned, it was decided to extend the system to handle bales from a second press located almost opposite the middle of the powerway. For a time this seemed impossible to accomplish as a proper means could not be devised for the return of the carriers from the far side of the power cable to the second press. The opposite sides of the power trackage, being at different elevations and the cable troughs paralleling each rail, seven inches below the rail, made it impossible to use standard switches or turn tables. A satisfactory solution was finally found by installing special switches of the gate or swinging type, permitting the return carriers to pass by gravity beneath and at right angles to the main powerway. The arrangement as installed is shown in Figs. 8 and 9, this arrangement permitting the independent operation of either press, or with a switch operator, the use of both presses at once by alternation of bales and carriers. The cross-unders are semi-automatic in action and are safeguarded with protective devices to insure proper operation unless grossly abused. (Figs. 10 and 11.) Leaving the powerway at the take-off, the bales under gravity coast across the 60-foot street on an "A" frame superstructure, to the point of entrance to the warehouse. If first floor storage is desired the trackage is set so that the bale, still under gravity velocity, enters the warehouse and coasts for perhaps 50 feet before stopping, to be propelled from that point by hand push to its final destination. If second-floor storage is desired, automatic elevators of unique design are used, one lift to carry to the upper floor, the other to bring down the empty carriers and grabs, depending upon the handling scheme pursued.

At the point of entrance to the elevator, a mechanically operated tilting or feeding device, controlled by the motion of the elevator slide, permits the entry of a single bale at a time. The elevator instead of carrying a platform or cage, carries only a section of rail equipped with safety devices and pitched to give a gravity roll in one direction. The bale carrier rolling to position on this rail section, is stopped and held in central position by the safety, the carrier wheels at the same time operating a secondary control switch which starts the elevator in the correct travel direction. (See Fig. 12 for the feeding device at the elevator entrance.) At the end of the travel the safety is released, the

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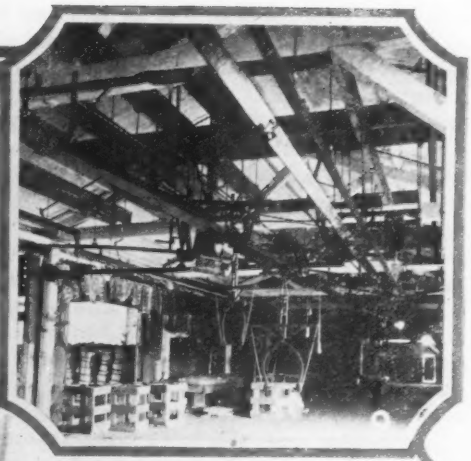
This semi-automatic monorail system includes about 3500 feet of trackage and with bale travel in both directions.



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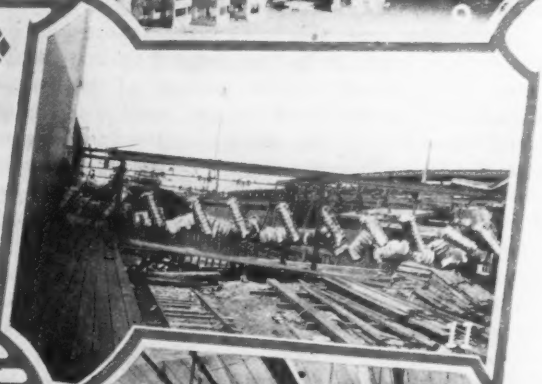

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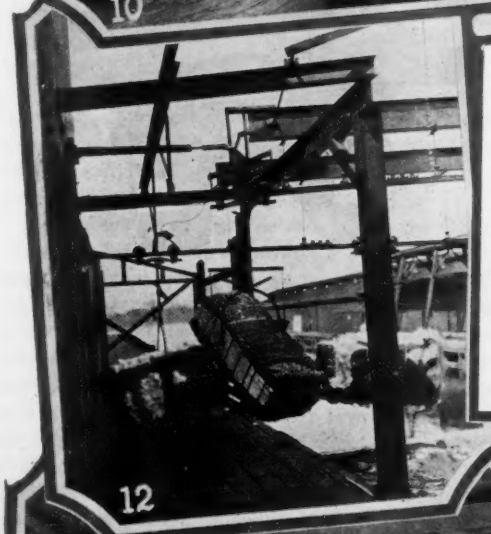

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A system designed to speed up operations, reduce labor, and permit a greater flexibility in handling than has been previously afforded.

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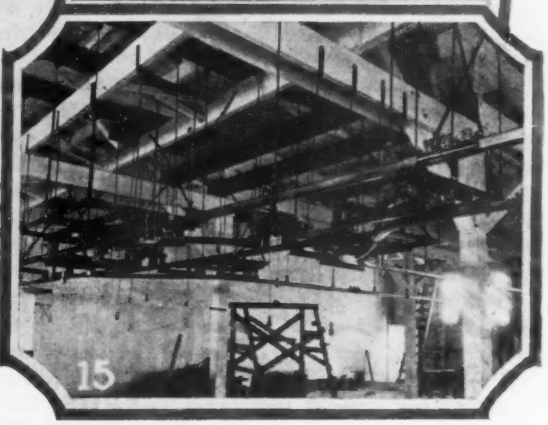

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carrier rolls from the elevator to the stationary trackage, operating in its travel another secondary control switch which causes the elevator slide to return to its first position. A lengthy description of the control circuits and protective devices, both mechanical and electrical, would be out of place in this article, but it is sufficient to say due precaution was taken to insure satisfactory and safe working at all times. The travel being always in one direction on each elevator made it possible to carry out the automatic feature to a point where no manual supervision is necessary other than the proper inspection which all machinery should receive and the necessary watchfulness to insure safety and continuity of operation. At the point of take-off on the "up" elevator and entrance at the "down" rig, it was found difficult to match the trackage exactly, due to the variance in the weight of bales and its effect on the travel and stoppage of the elevator cage; this was successfully overcome by introducing a hinged or floating section of track at the entrance point, controlled by the movement of the elevator cage. It was likewise found that the impact or inertia of travel was of serious proportions when the elevators were operating at rated capacity of three bales a minute, but by the use of pneumatic shock cylinders with adjustable bypass almost shockless operation was secured. (See Fig. 13.)

Leaving the elevator, the bales are then pushed by hand power to the final section of the warehouse selected for storage, dropped by the grabs directly onto two-wheeled factory trucks and up ended in their proper storage lot in the desired position by the truckman. A point of further refinement is the possible use of an electric or gas tractor to push the bales from the elevator to the final destination and to bring back the empty grabs and carriers. However, with the hand scheme, one man can push from four to seven 500-pound bales as easily as a single bale is handled with the floor truck so that the tractor use is a function of the length of haul.

The trackage, throughout both floors of the warehouse, as before mentioned, is laid out on the return circuit or loop idea, so that travel is always in one direction. In the Champion warehouse, the trackage (two rails) passes through six fire wall openings, each opening protected by two sliding type Underwriters' fire doors. Tramrail fire door sections are installed which are operative either by the fusing of links or by the action of the fire doors, the removable section of track being so suspended and spring actuated that it swings entirely free of the door opening ahead of the action of the door. The device has been inspected and approved by the Atlanta Underwriters Inspection Department.

Figure 14 shows a general arrangement of the warehouse trackage and Fig. 15 the switching scheme employed on each floor to give the desired flexibility of operation. All curves on the installation, including the switches, are laid out on 48-inch radius and were bent on the job. The trolleys are all equipped with hardened wheels operating on heavy duty, double row ball bearings running on hardened and ground races and cones.

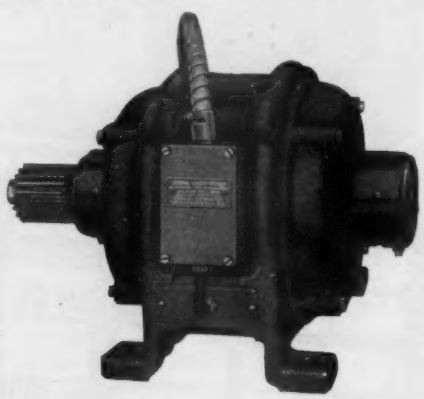
At first thought, the handling of 500-pound bales of uniform size does not appear to be a severe duty but the rapidity of travel, continuity of duty and frequent changes in direction of travel, make the service more gruelling than handling many times the 500-pound weight on a slow-moving system. In designing the apparatus and in the construction work, this thought was continually kept in mind, so that in many parts details seem all out of proportion to the unit load handled.

While it would be somewhat premature to draw sweeping conclusions until the system has passed through a full season of service, the tests and results to date are sufficient to make both the compress people and the tramrail manufacturer most optimistic. It is believed that the system will speed up operations, reduce labor both in number and effort, and permit an even greater flexibility in handling than has been afforded with hand trucks.

A Motor Protective Device.

An ingenious and useful device for the protection of motors and generators has been invented by D. C. Leonard, 94 Morris Street, Greenville, S. C. This invention, which is shown in the accompanying illustration, is designed to provide a means whereby the electrical current is cut out automatically in the event a motor or generator becomes overheated.

The device consists of a junction box secured to the frame of the motor or generator with an insulated container inside of the junction box to carry the fuse and fuse holders. The fuse is made from a low melting alloy



that melts at a low temperature, and is designed to melt out, breaking the electrical circuit before the motor or generator is damaged from overheating.

Mr. Leonard hopes that this invention in the future will make it so difficult for the winding of a motor or generator to be destroyed from overheating, caused so often from single phase, loose connections and other things that destroy the insulation, from a high temperature, as to make it possible for the textile and other industries to insure their motors and generators against burnouts and loss of time. Arrangements are being made to place this device on the market at an early date, with especial application to automobile generators and small size motors.

Louis Lowinson & Co., 72 Leonard St., New York City, advise that the Lowinson Comparative Cotton Goods and Cotton Chart for the year 1923 will be published in January, and that anyone interested may secure a copy gratis by applying to them. As usual, this chart contains the various prices for cotton goods and cotton for the year 1923 and owing to the various gyrations of cloth and staple during the past year, this should be a very interesting index.

The College Man in the Mill

BY L. L. ARNOLD

PRESENTED BEFORE THE CLEMSON COLLEGE SOCIETY OF TEXTILE ENGINEERS, CLEMSON COLLEGE, S. C.

It is customary in making a talk of this character to preface it with one or two jokes or stories, but to bring a joke to Clemson, the home of the inimitable Dr. Daniel, would indeed be bringing coals to Newcastle with a great probability that they would fail to ignite and create the impression intended.

It is also quite the customary thing to announce a subject and then go over, under and around that subject but never by any possible chance directly touch it, and, in spite of popular opinion to the contrary, an editor is quite human in many of his characteristics, so it is quite possible that I shall live up to the reputation of the average speaker. You know, in some respects, an editor and a cow have a number of similar characteristics. You put a cow in a ten-acre field of good grass and she will crop all over that ten acres getting about a bushel basket full of grass—or maybe two. And the milk of the cow, which is her product, is sometimes rich and sometimes thin and blue looking. It depends a good bit on the cow.

Just so with an editor. He will browse around getting an idea here, a thought there, an illustration somewhere else, and then he will write a composite that is called an editorial. These editorials are one of his products; and like the milk from the cow, some of them are good and some of them are so thin and blue looking that he feels they would never get by an inspector without a fine for selling the public an adulterated product.

There was quite a little talk during the war period about artillerymen shooting at soldiers they couldn't see, the range often, I might say usually, being given them from a balloon stationed high in the air, and the results of their shooting were likewise observed.

An editor is in much the same fix as the artilleryman. He shoots his ideas at his readers and as he has no professional observer on the job, he never knows how his stuff is being taken, or whether it hits the mark, unless some reader writes in and tells him about it. That is why an editor is so appreciative of letters that talk about his magazine.

And while I am talking about editors and letters, there is another thought I wish to express. There seems to be a popular conception that an editor is not only a walking encyclopedia, but is also well versed in crystal gazing and gifted with an unusual ability to see into the future. As an example of this, a man wrote us in August, 1922, and wanted to know how the production of the cotton mills of the South for the last four months of that year was going to compare with the production of the same four months of 1920. Also how the production in the southern mills in 1923 was going to compare with the production in 1920 in percentages. Remember: this was in August, 1922! Then another man wrote in and wanted us to tell him how many set screws there were in an average 50,000-spindle cotton mill. Still another desired to know the number of braided corset laces used annually in the United States, and the length. And only last month an inquirer asked for a list of all products that use cotton cloth as a component part of their construction. It is still the favorite indoor sport of sweet girl graduates to tell us they are preparing a paper on the cotton industry, and will we please write a letter telling all about cotton from the earliest recorded history down to the present—just like that! And now Professor Doggett thinks we can make a speech!

I suppose you are wondering what all this has to do with you and the subject I was supposed to talk about. Well, I'll tell you: It hasn't the least thing in the world to do with the subject, but it is getting you better acquainted with us and our problems and will perhaps aid me in making you understand some of the things I am leading up to.

Away back in 1912, or about that time, we asked the question in an editorial, "Should Textile Schools Have A Human Nature Department?" We took the affirmative on this question and the added experience of the eleven years that have elapsed since that time has not changed our opinion an iota. Moreover, we have seen the time come when, even in the mills, they have recognized the necessity of carefully studying the men and women operatives in order to get the best from the machines on which they work.

Vice-President Thomas J. Marshall, in addressing the American Cotton Manufacturers' Association in Atlantic City in 1919, put his finger on the most vital spot in the whole business structure when he said: "Anybody almost can hire a hand; anybody almost can hire a head; but who is there among you who can hire a heart? That's your problem, gentlemen." And that is *your* problem and will continue to be your problem just as long as you continue to take an active part in any productive business in the world. You may call it psychology, human nature, humanics, anything that you will, but in the end it is the science of being able to make the other fellow happy and contented. Solve that problem and you have the "open sesame" to success.

Now comes the question, "How are you going to do it?" and to this question there is no well defined and concrete answer. If the answer could be found in any textbook; if the problem could be solved by the simple application of a formula; if an instructor could stand before you and tell you how to do this thing—then Clemson and every other college would have a "human nature" department. But every human being constitutes a separate problem. More than that, every varying phase of productive business as it applies to each of these human beings changes the conditions or the factors in the original problem so that the basic formula, if you try to work out a formula, is constantly being affected by new and unknown quantities that must be considered and judged, not by what you know about them, but by what you *think* you know, basing your judgment on the experiences and observations of the past. And when you are just starting out in the productive game, as you young men will be when you leave Clemson and begin to carve your separate niches in the world's business, you have little in the way of past experiences to draw upon, which makes the problem more difficult for you.

However, there is one angle in the game, one factor in the formula, that each of you *can* know, and *can* control, and that factor is yourself. No matter how much you theorize about the other fellow, no matter how carefully you segregate his fads and foibles, his strong points and his weaknesses, if you are not in a position to apply one constant factor to your formula, based on your own personal knowledge of yourself, you find yourself with an equation, both sides of which consist wholly of unknown quantities, and it is useless for me to attempt to point out to you students of mathematics where you would land if you attempted to build a successful structure upon such an unstable foundation.

Therefore, it is evident that in order to begin your study of "human nature," in order to properly lay the foundation stones on which you hope to later build up a successful career in the mill, it is absolutely necessary to begin by becoming introspective and taking careful stock of your own fads and foibles, your own strong points and weaknesses. It is absolutely necessary to success to first "remove the beam from thine own eye, that you may see more clearly to remove the mote from thy brother's eye."

In doing this first job, let me urge you in all earnestness to be thorough about it. Be honest with yourself. If you can't be honest with yourself, you can never be wholly honest with the other fellow, and success based on deception, no matter how promising it may look on the exterior, has rotten timbers in its makeup that will fail under pressure and the whole structure will fall like a house of cards.

After you have conducted a careful self-analysis one time, don't imagine that the job is done. It isn't. You are going to find that new contacts will change your viewpoint and it will be necessary to re-analyze your mind from time to time, almost from problem to problem, in order to maintain that constant factor so necessary to the successful use of your basic formula.

Then there are numberless details in the subject of successful contacts that you may study as you go along. Your approach to the problem will not be from the managerial angle. It will probably be several years at least before you can hire a hand or hire a head, but you can begin right away in your study of how to hire a heart. Begin right now to make every fellow in school like you. You don't have to hire them with money. You can't hire a heart with money, here, or later when you get in the mill. You can hire a heart only by paying wages in kindness, in patience, in fairness, in truth, in honesty. If you can learn to hire a heart here at school, if you can make the other fellows like you because you are honest with them and square with them and treat them decently, kindly and courteously, rest assured that when you get in the mill the overall man, the "broomhandle man," be he overseer or fellow worker, will meet you more than halfway when he finds out your methods.

Probably what might be termed the "prime factor" of these subordinate or detail contacts is the proper approach, and this factor is and should be entirely up to you as an individual. Your training here has fitted you to study a problem from its several angles and plan your attack intelligently instead of trusting to blind luck; it has taught you to think a question through to its probable end; and it has demonstrated to you the advantage of cooperation, both physically and socially. Therefore, when you get in the mill, it is only necessary for you to apply this knowledge in a commonsense way in order for you to be successful.

Human nature, while never the same in two separate individuals, always has some characteristics that are common in all. You know how you despise the fellow who thinks he "knows it all?" All right! Then it is fair to assume that the average man, in the mill or out of it, has that same general feeling. If you have knowledge that the other fellow does not possess, and undoubtedly you will have when you get in the mill, do not parade that knowledge around with a brass band at the head of the procession. It will be much better for you to wait until a problem arises that calls for some of your specific training, and then tactfully suggest that it figures out thus and so, and show the man you are working with the "why" and "how" of it. Usually you will find him appreciative. Usually you will find him approachable—and the exception may often be won by attacking from a different angle.

A recent contributor to our magazine—and a college man, by the way—puts a whole sermon into three sentences. He says:

> "The field of opportunity is actually being pushed upon the young man of today, but in the mill, as in every line of industry, the man must make a place for himself and fit into the line of work that he selects. The young man is the part that requires the shaping to fit him to the industry, for the cotton mill business is one of too great a magnitude to be changed to fit the man. The textile graduate is being handed a great field and it is up to him as to what he does with this opportunity."

But all these details—and I have really mentioned only one because of the time limit placed on these talks—are subordinate to and a part of your main theme, your basic formula. It all boils down to your ability "to hire a heart." The worker or the manager who does the most for you is the one who *likes* to work with you; likes to work with you because you have found the way to his heart by your own sterling honesty and ability. He wants to see you succeed, and he will strive in every nerve and sinew to help you win the success you deserve.

And now, one more word—

I don't wish to take this occasion to advertise COTTON—most of you read it in the library, anyway—but I do recommend for your careful study the modern fables, not by Aesop, and the sayings of "Old-Timer." The simple philosophy contained in these articles will work in well with your introspective study and you will find more than one case where the moral will apply. Like bad medicine, they may not taste pleasant, but the result will be beneficial.

Also, there has been in the past five or six issues quite some discussion on the college man in the mill and there is more yet to come. While we do not always agree with the writers of these letters, there is much in them to create thought along the lines I have been discussing tonight, and if you will read them carefully and reason out the causes of the success or failure of these individual writers, you will, in that way, be able to capitalize some of the experience of others on this difficult and abstruse problem.

Before complaining that a man has too much, be certain that you know how he has acquired what he has and the use he makes of what he gets. The way it was obtained and the use of wealth usualy justify its possession.

The Catapult and the Cranium

The Seventh Modern Fable

NOT BY AESOP

When Adam was a little boy—to go back to the beginning—and put in most of his time playing out in the garden over at Eden, his disposition was the despair of the neighborhood.

Whenever his pet Ichthyosaurus would come out of the woods for a pat on the head and a little interior decoration by way of the flower beds, and drape several fathoms of placid personality across the hollyhocks, rabbit tobacco and forget-me-nots, the young hopeful of the world would get so riled that his language was astonishing. Kicks in the sides were futile and rocks hurled by arms which lacked the training of the modern high speed pitcher bounced off of Ichty's scales, fur or feathers with but little impression, so our young friend had to fall back on his head. Figuratively, of course, not literally—unless Ichty thought he looked green and reached for him—but he had to use his noodle.

Green apples whisked off the end of a limber switch proved more forceful and only slightly less accurate as to aim. This idea marked the beginning of invention, and as it successfully removed Ichty from off the roses it was as far as Adam ever got in the science of war, but it was far enough, for him. Afterward came the sling-shot. Not the forked and rubber banded contraption with which you terrorized the neighborhood while I was properly in school, but a thing of two strings with a pouch between to be whirled about the head as an extension to arms already started on a course of training which in far distant future years would make baseball the greatest game in the world. This was what David polished off Goliath with and in unskilled hands was as dangerous to friend as to foe, but this was never considered as a serious drawback, when everybody was out for a good time, anyway. As the game of war grew in popularity, however, and advanced from an individual to a community pastime, something better had to come, and the catapult was produced.

The catapult was nothing more than our friend the sling grown from man size to mob size. Instead of the strings being held in the hand they were attached to the ends of a couple of stout sticks; the other ends of the sticks being inserted between twisted ropes. If the ropes were twisted tightly enough a stone could be placed in the pouch, drawn back and let go for a considerable distance before it struck the enemy—if it did. The gentlemen of that period, however, being universally endowed with good eyesight and agile dispositions, generally managed to skip out of the way before the missile arrived, so it merely plowed a furrow or else hit something it wasn't intended to. Still, it was the best they could do, and this little ornament to society was lugged around considerably by various Greek and Roman tourists on their sight-seeing trips through Europe and remained the favorite argument adjuster of the times until someone discovered that the Chinese had invented gun powder several thousand years before.

After that things got into a mess, just as always happens when a good game gets into the hands of professionals.

All of which is very historical and just as accurate as your faith in the printed word, and leads us directly to the manufacture of cotton. The catapult was never much good as a weapon of defense. It cannot be denied that the missile it threw would knock the daylights out of an enemy if it hit him, but it hardly ever did. Its aim was not accurate enough. As an offensive weapon, it did better. It would throw a certain distance and maybe shoo somebody a little farther off.

With the passage of time and the development of so-called scientific warfare it fell somewhat into disuse, and it would be natural to suppose that it had been abandoned altogether, but such is not the case. A bronze box under a corner of one of the largest pyramids of Egypt contains records to show that the first cotton mill overseer known to history resurrected it from the ash heap, blew the dust from its ancient strings and sticks and almost wore it out. This box of records has not been dug up yet, and probably never will be, but we don't need it. The evidence is before us. Nearly every mill man has one these days which he uses more or less—generally more. As a weapon of defense it is a total loss, but for offensive purposes——

Properly used you can offend everybody around the place with it, and here's the way it works. Suppose you see somebody doing something he ought not to. Probably it is some small neglect of duty which a few words would set right without any ill feeling on his side or yours. Maybe it is a more serious fault which could still be quickly adjusted with a few frank words and as quickly forgotten. Your duty as his superior is not to drive, but to lead; to say, right then, without heat or fear or favor that thus and so should be or should not be done. He probably knows this already and feels guilty about it, but has gone wrong through a natural cussedness of the human animal, which will not prevent him from taking your correction in good part if you go at it right.

Do you? Probably I should ask do we, for this is a fault which, in a greater or less degree, is common to all of us. The chances are that we do not. We pull out our little catapult and begin to wind down. Then when the bow is bent 'way back and we have fretted over this little grievance until our bow string is so tight that it sings in the wind of our indignation, we let go promiscuously at the first head we happen to see.

"See here," we shout. "Do you know what I caught that there ding-danged, slab-sided, two by four, mentally flat-footed blatherskite doing this morning? Betcha can't guess! Why, he went out with a lot of cotton all over his clothes, and when he passed the office, the wind blew my inkwell full of lint. What do you know about that, hey? After all I've told 'em about brushing off before they go out, too! Why, that feller, he ain't got any more brains than a furnace door's got a draft gear!"

And so on. Probably you are beginning to recognize yourself. I hope not, but I am afraid so. Not all the time, maybe, but some. And you get the idea. You have shot, lustily, with all the force in you, but where? And when the missile strikes, from whose devoted scalp does the

dull and sickening thud resound? Not from the man in fault. He is not there. If it strikes sparks from anybody's osseous dome, it will be your own before it stops traveling, although you may not think so just then.

Of course you hope that whoever hears you will run to the one you are talking about and say in a soothing tone, "Now, the old man, he don't love for you to do that there," or words to that effect, and of course you hope that in the telling he will tone down and soften what you really said —because too literal a transmission might be a trifle embarrassing—and so the matter will apparently adjust itself without your bothering any more about it. In other words, you hope that he will be accommodating enough to wear off all the rough corners and sharp edges from your jagged rock of correction and when he has used his own skull to polish it down to a nice little smooth stone such as anyone would be proud of, to take it to the other man and say "Looky what lit on my bean, but it wasn't meant for me, so it didn't hurt me none to speak of."

Will he?

If he is the right kind of a man he will not. He will cram it down your throat unpolished. But if he is the right kind of a boot-licker he will, all right, and by the time he gets through with it, he will have engendered in its receiver a first-class contempt for a superior so lacking in moral courage as to be unable to go directly to him with a complaint. And in the end, as I have said, it will bounce back onto your own head.

Nor are the catapult toters confined to the bosses by any means. How often have we heard a hand grouching around to anyone who would listen, an extemporaneous lyric the oft repeated refrain of which ran, "The boss sure done me dirt!" And yet it is more than likely the boss had no such intention. The bosses that indulge in spite work and petty meanness are as extinct these days as Adam's Ichthyosaurus. And for the benefit of those who have never had the responsibility of directing the work of other people, let me say that every boss worthy of the name is always glad to hear and set aright just grievances. In his position it frequently becomes necessary to do things which do not meet with the approval of everyone. That is to be expected. Consequently he does not have the time to listen to the immaterial whining of the chronically dissatisfied employee who will have to go to the door of Heaven to spit every so often, when he gets there, but he is glad to set straight any injustice that is done to even the humblest of his workers. He has sense enough to know that only in that way can he keep an industrious and satisfied set of help and only by keeping them that way can he hold his job. On the other hand, there is no one the boss can get sicker of in record time than a chronic grumbler, so if you feel like singing that refrain, go sing it to him, because bellyaching around over the place is the quickest way to get fired I know of. He won't take you back, either.

As anyone with a sufficiently limber neck and active running gear could avoid a catapult shot provided he saw it coming, so anyone around your plant can and will easily duck your catapult shooting if he has a mind sufficiently astute to know when to come in out of the wet. All he has to do is to claim that you were not shooting at him, since you did not hit him. And in the main he will be justified in his attitude. Remember that everyone, high and low likes a little special privilege if he can get it. No matter how small a thing it may be, it tickles us to think that there is something that we can do that the boss won't let anybody else get by with. And no matter how willing we are to admit that one rule for all is the best, and no matter how fair minded we are, we—you and I and all the rest of us—will overstep the bounds if we can and then if the boss comes and talks about someone else who is doing what we are and must be brought back in line, we enthusiastically agree that this should be done, but all the same it never occurs to us that we ought to get back in line too.

But if we are jerked up short, if it is done in the proper way, we laugh and say, "Oh, well, I knew I was wrong. I just wanted to see how far I could go with it before the old man called me down." And there is no hard feeling because we knew we were off our beat.

But suppose the boss talks all over the place about us? How do we feel? Or suppose someone comes to us and says a lot of things he says he heard the boss say and we wonder whether he has softened the shock to spare our feelings or added a little speed on his own account? It is not a pleasant feeling, is it? No, and we would be more—or less—than human if we did not feel prompted by a perfectly natural resentment to say something about him and the boss too, in order to get even with everybody. Which is what I meant when I said that the catapult gunner's shot generally lands back on his own head.

Think it over!

Then throw away your catapult!

An authoritative review of the economic year throughout the world, prepared from the point of American industry and commerce, has been issued by the Department of Commerce in the form of the first issue of the "Commerce Yearbook." The aim of this book is toward the ultimate stabilization of business and industry through the reduction of economic losses resulting from the recurrent extremes of the business cycle. It was compiled in response to the demands of American business men, bankers, economists, trade association executives and the trade press. This first issue covers not only the year 1922 but also the early part of 1923.

This yearbook should meet the need, not merely for a reference source to be consulted only for specific facts on the recent past of business, but for a book that can be read for general commercial information and for a survey of the most important economic developments of the year. The outstanding facts of trade, production, price changes, and market conditions are conveniently tabulated and analyzed in relation to one another so that their interdependence may be readily recognized. Summaries are included of the principal manufacturing, mining and forestry industries, of agriculture, construction, transportation, communication, finance, prices, and domestic and foreign trade of the United States, with reviews of the commercial and industrial developments in the principal foreign countries. Copies of the Commerce Yearbook can be obtained at the price of 60 cents, the cost of paper and printing, from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from any of the Bureau's district or cooperative offices.

Nothing is uglier than an insincere smile.

Human Relationships in Industry

BY W. M. McLAURINE

Job Analysis.

In the Hiring Problem which was discussed in the preceding issue there are two other phases which may be discussed either separately or combined. These phases are the man or physical requirements of the job, and the manipulative or mechanical requirements of the job. They may be united into one head and called job analysis.

To follow the theory of physical and mental fitness for mechanical and manipulative skill suggests the fact that is known so well in certain cases, but entirely ignored in general. There are certain ages, temperaments, physical characteristics of the employee that lend themselves splendidly and highly efficiently to certain classes of work, and may be a hindrance in other types. To be specific, if a careful study is made of the best spinners, doffers, weavers or any other group of workers, and this study is worked out in detail, it will be found that there are certain physical abilities, mental attitudes, and peculiar qualities of skill that they have, and these are all similar.

Then, if a study of the lower group or the poorest group of spinners, doffers, weavers, etc., is made, it will be found that the physical abilities, mental attitudes and skill are different from the first class.

This is a very valuable study, as it is a well known fact that there does exist this difference, and two very important pieces of information may be brought out in this study. The first is, what are the best qualities that a prospective employee should have to be a first class operative? The second fact reveals the deficiencies of those less able and should furnish a very concrete basis upon which a constructive instructional program could be evolved.

To be still further concrete and specific in this statement, I offer two examples taken from life, and the overseer may be able to use dozens more. The doff boy is a key man in production. When he works, the machine is stopped, and production is at zero on that particular machine—hence it is very important that this class of help should be highly efficient. In discussing this with a group of overseers before a careful observation had been made, they took the attitude that all boys doffed alike. After they had studied the boys analytically they returned and reported that there was a great variety in the manipulative operations, and became very much interested in other studies.

On one occasion I was visiting a mill and in the weaving department they used "battery fillers." I noticed that one girl kept up quite a lot of looms more than the others. I spoke to the superintendent and overseer about my observation, and then we watched her and then one of the other girls. Space, however, will not permit a delineation or comparison of the operations of the two girls. But it is an evident fact that all overseers acknowledge in regard to weavers, spinners, etc.

The more work that can be done by the employee, the greater the wage earned. The less the supervision, accident probability, overhead, the greater the income, and the greater the possibility for economic thrift.

What then may we consider as job analysis, without being too technical or highbrow?

1. Does the job require physical or mental work, or is it a combination of both?

I. Physical requirements:
- 1. Body build
  - a. Tall
  - b. Short
  - c. Medium
  - d. Heavy
  - e. Light
  - f. Medium
- 2. Bodily condition
  - a. Hard
  - b. Elastic
  - c. Soft
- 3. Strength and skill
  - a. Arms.
  - b. Back
  - c. Hands—fingers
  - d. Legs
- 4. Speed
- 5. Endurance
- 6. Activity
  - a. Slow
  - b. Fast
  - c. Rhythmical
  - d. Spasmodic
  - e. Strenuous
  - f. Gentle
- 7. Sense perception
  - a. Visual
  - b. Aural
  - c. Tactile

II. Mental requirements:
- a. Aggressiveness
- b. Perseverance
- c. Originality
- d. Initiative
- e. Imitativeness
- f. Obedience
- g. Imagination
- h. Judgment
- i. Dependability
- j. Caution
- k. Alertness
- l. Responsibility
- m. Patience
- n. Courage
- o. Accuracy
- p. Self-confidence
- q. Honesty
- r. Cheerfulness
- s. Courtesy
- t. Tact
- u. Education

Etc.

III. Miscellaneous Requirements:
- a. Age
- b. Family relationship
- c. Occupational expectancy
- d. Physical handicap
- e. Class of help employed
- f. Education

The foregoing analysis is largely a suggestive method of arriving at a basis for each employer to work out a chart for the employment of his own help.

This, to be sure, is a general analysis of some of the positive factors that should be considered in employment. It occurs to me that after this general chart has been made, that the employer should then proceed to a definite checking of his best help, checking individuals and not groups. After a sufficient number has been checked to insure something like a general average, the individual characters should be combined to get one cosmopolitan general idea of qualities that the best help have.

The next step in the process is to study the machines or jobs apart from these general qualities. What are the operations that they perform, and what manipulations are necessary for the most successful operations of the machines.

To briefly indicate what is meant by a study of machines: (1) What does it do? (2) How does it do it? (3) How can it be operated for greatest efficiency? (4) What are the most common errors that are made in its operation and why? (5) Kind of physical and mental requirements necessary for a theoretical hundred per cent

efficiency; judgment; initiative; accuracy; attention; speed; endurance; safety; etc.

After this has been made a comparison or parallel study of seeming machine requirements, and physical and mental characteristics of help can be made, and then after a period of study and observation, automatically a state of mind will be developed in the employer that will unconsciously guide him in his employment. The fact that I am trying to stress is that we must employ people for definite or supposedly definite jobs. The old theory that a man can do anything provided he wants to do it bad enough is only partially true, and if it were true in its entirety, there are so few people who want to succeed "bad enough." Again, it is my theory that the great God wants, and planned for every man to be a success. If sin had not cut across the plan, millenium would have always been.

People have been lost in the maze of indefiniteness and aimlessness. They have groped and struggled helplessly and hopelessly. Reverses have overcome their attempts as many of them were made in wrong directions. Hoboes and ne'erdowells are the result, not so much of an inborn desire to be such, but an inability to connect with the great plan of the Divine, and carry on to success.

I believe everyone has a definite piece of work to do in this world, and his success is measured in proportion as he does this work, or approaches its execution.

Believing this, I believe that in the great economic plan there are people born with physical and mental capacities and aptitudes for the carrying on of the world's constructive program. Therefore, I believe that there are certain groups or types of people who will make great successes in our great cotton manufacturing plants. (If I may paraphrase here and indicate that success does not mean the accumulation of wealth or high social position. It may, but often it does not. It means finding one's job and doing it with all the heart and soul, honestly worshiping God in its execution. In love with your job, happy and thrifty.)

To proceed to a more definite statement, I believe that in a mill there should be further discrimination as to employment and placement of people. I may have digressed here, but I want to state that while it is not good to keep the help in a state of flux within the plant, it is advisable to study people and machines all of the time with the idea of getting the right person and right job together. It is important to keep this in the foreground of consciousness in the employment of people.

It is difficult to discuss a concrete subject in an abstract way. I fear that I may have outlined or suggested what may seem to the superintendent and overseer an idealistic and moon-beam theory which looks well on paper, but in practice, is unworkable. This is not an untried theory. It has been tried out in a group of plants throughout the United States and has been found highly satisfactory. It has been worked out by the superintendent with his men. While this topic has been discussed in connection with the hiring problem, I shall indicate several advantages to be derived therefrom.

Job analysis is of value:

1. It gives to the overseer concrete and concise information relative to the requirements of the job.
2. It removes hazy and obscure ideas.
3. It gives a definite basis for instruction.
4. It gives a definite basis for placement.
5. It gives the overseer an intelligent background for supervision.
6. Intelligence inspires the confidence of the help, and confidence is the great basis upon which rests all progressive business.
7. It enables the overseer to properly distribute work and responsibility.
8. It enables the overseer to locate responsibility.

The foregoing are only a few of the most important of the advantages of job analysis.

Please bear this in mind in conclusion, that we are still discussing the hiring problem, and I want you to particularly keep in mind Job Analysis in relation to this problem. People who are well hired make the most satisfactory help. They reduce such of our troubles as waste, low production, accidents, village troubles. They lessen supervisory responsibilities; make for cooperation. They are abiding members of our organization. They cease their nomadic wanderings and become people with fixed homes and abodes. Civilization dates from such a period in our history; and just so it seems to me that when we have a village full of happy, thrifty, loyal workers, progress for all concerned is a recognized factor.

This discussion may seem so long and verbose that it is too much to undertake. We people who have been trained in schools and colleges in formal education are bound to admit that of the hundred per cent we take in this work only about twenty per cent is really applicable in the practical work of every day life. It is necessary to take the eighty per cent to get the twenty per cent. It is like a chemical compound, the practical is mixed rather adroitly with the theoretical. We find that the eighty per cent also aids us in discussing the twenty per cent practical and without this theory the practical would be too heavy and dry. In practical life we dash here and there with a flash of practicality.

Just so it seems to me in conference clubs with overseers that a detailed discussion is necessary for the same reason. It broadens our vision, sets our minds "agoing," adds new life to our prosaic work, and stimulates our ambitions. When we finally return to our practical every-day world and begin to employ help again, we may use the same method, but our questions and the applicants' answers will mean so much more.

In conclusion I would like to repeat what I said in a preceding article. There is no perfect hiring policy. There is no standard form. With the most expert, mistakes will occur. We can improve. We can keep alive. We can study our problems. We can make fewer mistakes. I am wary of the man who never makes a mistake. I respect the man who makes mistakes and honestly acknowledges them, but is struggling to eliminate them. We belong to this class, I believe. In this spirit I have written this paper.

If any reader has suggestions or criticisms to make, if he will send them to the editor, I shall greatly appreciate receiving them.

In the next issue, I shall discuss "The Interview."

An industrial survey of the city of Rome, Georgia, has recently been completed. Anyone interested in learning of the advantageous industrial locations in and near this city may secure a copy upon application to W. R. Crites, secretary of the Rome Chamber of Commerce.

The Year in the Cloth Market

Next to the fact of a third successive year of light yield in American cotton fields, due to weather and boll weevil conditions, the outstanding feature of 1923 in the cotton industry was the further development and astonishing diversity of expansion in the producing facilities in the southern part of the United States. The true meannig of this great change, nor the probable effect upon the world's trade, cannot be hastily summarized, nor told of with accuracy until the passing of a few years gives opportunity to grasp the full extent of this most wonderful accomplishment. In no other country in the world would such a great work go on as a matter of course and without special disturbance in industrial channels.

Another fact that may have far reaching consequences, is the entrance into cotton manufacturing of Henry Ford, one of the pre-eminent mechanical geniuses of his time. Backed by an abundance of capital, and approaching the problem of cotton cloth production free from the impediments of custom, it is quite within reason to expect that in conjunction with expert engineers, he may bring about changes in processes that have necessarily been slow of development, because of the solidity and inelasticity of what may be termed "vested interests" in patents, or the stubborn effect of habit on workers. These are things that will certainly better be judged in retrospect, than hastily hinted at in any annual review.

While the industry has been generally free from labor disturbances of a serious character, it is a regrettable fact that a forced wage advance given to operatives when all the signs indicated a growing contraction in the world's purchasing power at high prices, compelled American mills to enter upon a higher plane cost of production than manufacturing prudence warranted. Whether for good or ill, the advance certainly did lead to a disorganization of intertrade relations in values, and the final effect is not yet well appreciated.

Cotton Goods Price Range in 1923.

The range of prices in spot cotton and cotton goods for the year up to December 15, may be seen from the following condensed table of changes on a few numbers of wide cloths and sheetings:

Count	Width	Weight	Open	High	Low	Close
80 x 80	39	4-yd.	14¼	15½	11½	15½
72 x 76	39	4.25	13	14	10¾	13¾
68 x 72	39	4.75	11½	13	10	12½
64 x 60	88½	5.35	10⅝	11½	8½	11
64 x 48	38½	6.25	9	10	7	9⅝
64 x 60	27	7.60	7¾	8¼	6¾	8
48 x 48	36	4.00	11¾	13	9¾	13
N. Y. Spot Cotton			26.45	37.60	22.45	34.35

The year 1923 opened with jobbers and selling agents for mills in a far more optimistic frame than a year previous. Cotton became firmer, and advanced steadily with but few interruptions, and closed a cent a pound higher than it opened. Prices on gray goods, sheetings and fine combed goods advanced steadily, but moderately, and trading was generally good, with many contracts entered as late as June of this year. The manufacturing trades continued to buy steadily. Prints and percales, ginghams, bleached cottons and other staples were advanced. Domets were opened for fall and were sold up and withdrawn within a short time in some of the large mills. Denims showed a sharp advance and were sold ahead freely. Wash fabrics were generally quiet in the printed end, but ratines and crepes were active.

Higher raw material values in February, together with rumors of wage demands in the New England field, made that month one of slowly rising prices, and underlying all was a very steady demand from the jobbing and manufacturing trades, resulting possibly from a month of active clearance sales and of great activity in many manufacturing channels. Print cloth numbers and many branded lines that had not participated in the advance of cotton saw higher prices. Toward the middle of the month dress gingham prices were made by several southern mills but these lines were quickly sold up and withdrawn. Near the end of February the largest Eastern producer made new prices, generally continuing spring values, but granting fall dating on bills in accord with the request of the jobbers' association. The silk show influenced activity in printed goods lines in all novelties of Egyptian designs.

March, closing the first quarter, brought the highest prices of that period in cotton and cloth, with a slight reaction near the close of the quarter. Definite announcement of previously rumored wage advances, of 10 to 12½ per cent to become effective in April, were made. Fall cottons were active and many lines of napped goods, blankets, ginghams, etc., were withdrawn. Uncertain cotton conditions and a quieter tone in the trade, etc., deferred the naming of higher prices on many standard goods, and in print cloths and sheetings, and some convertibles, second hand sales resulted in lower quotations, as much as a half a cent a yard decline being noted. Production, however, was at capacity, many mills on overtime, and the steadiness of the markets generally was considered as confirming the belief in a healthy condition of stocks.

Beginning with April a four-month season of uncertainty, curtailment, and slower business began. April saw great uncertainty in raw cotton that affected the demand for cloths adversely. Prices on gray goods, sheetings and some convertibles eased off with light sales. At Fall River sales were less than one-fourth of full output, and latter April brought notices of curtailment to begin in May, though Southern mills continued running in full and overtime. In view of the extremely light demand, however, prices held very well throughout the month.

The quiet of April was intensified in May by a continued unsettled and declining cotton in the cotton market, and cloth prices fell in goods other than those of print cloth construction. A light demand produced an adverse effect on fine combed goods, resulting from cool weather for most of the month. Sateen markets broke badly from second hand sales and many sheeting numbers dropped under cost. Trade in finished cottons was also slow. Denims for September were quickly taken on a named price two to three cents below current spot prices. Ginghams and colored goods felt a drop in demand, and shirting chambrays, and other similar materials had the price reduced. The month closed under somewhat better circumstances, with better weather and stronger cotton toward its end.

Speculative price movements in cotton, though it was higher, affected goods trading in June, and as orders began to run out freely curtailment of production increased

in Eastern and Southern mills. Declines in price and demand on many goods were experienced, print cloths, sheetings, etc., reaching the lowest prices of the half-year. Other lines were notably quiet.

A continuation of declining prices and light demand featured July, curtailment North and South continuing rapidly.

A recovery in August halted this curtailment following the long dull period, and there was considerable liquidation in some lines of colored goods, and many of the gray cloth sales were made at prices below the cost of replacement. After the surplus goods were disposed of it was possible to trade on higher levels and bleached cottons were advanced, and while percales and ginghams did not show much activity at the low July prices, the most active sales were in print cloths, sheetings, etc. Drills also sold more freely with some business on wide cloths for rubberizing for the auto trades.

This better condition was carried over into September, the markets broadening and sales becoming general throughout the month, following an unexpectedly low cotton condition report. Sales in unfinished cloths were better and more active than the finished goods sales. Better movement on heavy goods and higher prices on duck, tire fabrics, drills, sateens, etc., were noted. Print cloths were bought rather actively, especially by converters and bleachers. Percales continued quiet at a low price. There was improvement and advanced prices in bleached goods, and good business on sheetings, sheets and pillow cases. Lower prices on Southern dress ginghams for spring brought business there but Eastern mills retained fall prices. There was much better business on silk and cottons, following the Japan earthquake on September 1. Denims experienced higher quotations.

The sustained high price of cotton throughout October, a month when the movement of the crop is generally large, did much toward lessening the confidence in cloth trades, owing to the difficulty in getting satisfactory prices for the finished goods. Rather than go on, many mills curtailed production. Cloth prices fluctuated within comparatively narrow limits, and trading was much less than is generally expected of October, the last week, however, showing some activity in print cloths, sheetings and heavy wide goods. Percales and many other staple goods were unaccountably quiet. A reduction of two cents a yard was made on a leading dress gingham line at the last of the month, in the hope of stimulating business. On the same day, some bleached muslins advanced half a cent a yard, with some denims, on delivery for the first quarter of 1924, advancing one cent over the last contract price. The Amoskeag Company closed its cotton cloth mills on the 6th for an indefinite period.

November proved a better month in that sales were steadier and broader. But while cotton soared another 20 per cent, no parity advance was possible in the cloth markets. During the month percales were advanced, but with no rush to buy, and just before the close the largest lines of prints and percales were withdrawn from sale because of lack of profit and the unwillingness to contract ahead at a loss. Many gray goods and brown goods were sold under cost of replacement based on cotton values. Bleached cottons were advanced. Fall River print cloth mills curtailed to 40 per cent of capacity, with some New Bedford mills on short time, and some Southern mills stopped overtime work and others curtailed. Amoskeag reopened in part during the month, operating three days a week. A great many goods were withdrawn from the market because of lack of profit and there was some small export trade done with South American and island markets.

Prospects for 1924.

There will be a very general curtailment of cotton goods production due to the shortage of cotton. Competition will be sharp and the mills whose managers have been forehanded in purchases of raw material will be the chief beneficiaries. There is a very great volume of cotton goods moving into consuming channels from mills that was sold below the cost of replacement, and is even now owned much under that cost. This will give jobbers and retailers relatively cheap goods to work on for some time to come and mills will find it difficult to secure satisfactory prices for their output.

On the whole, with a presidential year before us in our own country, there is nothing any more bullish in the purchasing and consuming outlook than there was a year ago. The European muddle still continues and its effect upon imports of cotton cloths and export of cotton cloths is being felt in the cotton goods trade as well as in other directions.

There can be no very great change in the cost of production as affected by labor costs until there has been a period of unemployment or very much greater immigration. None of these things is in sight.

The costs of doing business in all channels are abnormally high, due to taxation, rents, wages, and many other things. This is constantly tending to make profit margins elusive and narrower.

The year will certainly be a much harder test of conservatism and experience in business than any of the ten that have gone before, the element of speculation not offering such prospects as have made millions in recent years for many in the textile industry who have not followed safe business rules. On the other hand, the temper of the country is less radical, and the disposition of seasoned manufacturers toward conservative practices is more cheerful. With the exercise of care and prudence there seems to be every reason to expect a very fair year in 1924, in spite of the manifest obstacles that lie in high cotton and cloth costs.

The Diamond Chain and Manufacturing Company of Indianapolis, manufacturers of steel roller and block chains for transmission of power, announce they have completed arrangements with the Chain Belt Company of Milwaukee to represent them on the Pacific Coast through their newly established branches in Seattle and Portland.

Both companies are well and favorably known on the coast, having formerly been represented by Meese and Gottfried Company of San Francisco. The Chain Belt Company will carry complete stocks of Diamond chains and are prepared to give good service on all roller chain requirements of old and new customers. The Portland office is located at 67 and 69 First Street, and the Seattle office at 1040 Sixth Avenue, South.

It is reported that only one per cent of the men in Hungary wear underwear.

Fall River Operating Executives Meet

As was announced in the December number of COTTON, the series of discussion meetings for the Fall River textile operating executives were resumed on Wednesday, November 21, at the Bradford-Durfee Textile School in Fall River. The subject discussed at this first meeting of the new series was "The Properties of Cotton," and the speaker was James McDowell, of the Sharp Manufacturing Company, whose interesting address in this connection at the Providence meeting of the National Association of Cotton Manufacturers, was reported in the June number of COTTON.

At the Fall River meeting, Mr. McDowell read a very complete paper on the subject, and exhibited stereoptican slides in connection therewith. There were about 300 Fall River mill men, including agents, treasurers, and overseers, and after Mr. McDowell's address, quite a number of questions were asked by the men, and an extensive discussion engaged in. Both Mr. McDowell's address and the discussion are reproduced herewith. Mr. McDowell spoke in part as follows:

"The analysis or testing of textile fabrics is rapidly becoming more necessary. The diversities of fibers used in the manufacture of yarn and cloth and the numerous methods used in a combination of fibers render it imperative that the handler of cloth and yarn should know the rudiments of the art of differentiating between the fibers contained in a fabric, the kind of cotton used, or the combination of different cottons, and the selection of a proper kind of cotton to make yarn that will mercerize and come into competition with silk.

"It is only from an analysis of the finished cloth or yarn that is ready for use that the whole facts can be obtained. This analysis will be made by the manufacturer and buyer from two different standpoints, one with an idea of maintaining its appearance and cheapening its construction, the other having in view a retention of the quality both of the finished and raw material and safeguarding methods employed to obtain the same cloth.

"The advance which has been made in scientific examination the last few years has made it possible to turn these investigations to the best use in the interests of cotton manufacturers.

"Where rule of thumb is employed it always happens that one process is carried on without any thought of the next process and very often injury occurs which the next process cannot overcome.

"The advance of technical education in Great Britain has shown, however, that there is no department of industrial art where there is more need of scientific knowledge than that of textile manufacture, not only on account of the nature of the raw material used, but because of the varying process it has to pass through. In the foundation of all successful manufacturing there must be a thorough knowledge of raw materials and the character of fibers as to spinning, dyeing and bleaching.

"Testing is not a science which underlies the production of textiles, but, at the same time, it is a connecting link between theory and practice.

"It is necessary when discussing the testing of textiles to point out that the subject can by no means be exhausted by a most careful examination of the operations carried out.

"In most testing rooms in a mill it is usual to have a warp reel and strength-testing machine, a balance for yarn, and it may be, a moisture-testing apparatus, also a twist-tester. In quite a few exceptions one may find a microscope and some other machines, regarded by the boy in charge, who is known as the tester, with reverence and seldom touched.

"As so little is actually known among spinners as to the qualities and spinning value of cotton, they might be studied to the advantage of all. Doing so might also suggest the advisability of a special inquiry into the value of the distinctive varieties with a view to finding supplies capable of producing a yarn equal to that which they are now producing, and at a cheaper rate.

"Twist in the fiber, which is so marked in cotton, is not generally possessed by vegetable fibers. Almost all other fibers are very smooth with no form of a twist, such as vegetable down or boxbax cotton, milk-weed, or thistle-down, which exceeds the luster of silk but which cannot be spun.

"The peculiar characteristics of twist, which are so well marked in well-matured fibers of cotton and give it a good spinning quality, are not in the fibers taken from a pod that has not opened. These are some of the reasons why bolly and snap cotton do not spin well.

"The functions of twist are to bind the fibers together so as to prevent slipping under a certain strain, and the strength of yarn may be unsatisfactory both because of excessive twist and from insufficient twist. Twist may be said to have been applied in excess when it exceeds that which is necessary to prevent a slippage of the fiber under strain. The maximum twist strength limit may only be raised by an improvement in the order of the fibers and by using stronger and finer cotton.

"Cotton grown in different parts of the world differs considerably in length and fineness of staple, such as our own cotton grown in the islands off the coast of Georgia and Florida or the cotton with short fibers grown in China and India. With these the length varies from two inches to five-eighths of an inch. The length and character of any cotton can only be taken approximately for any given season, as the average length and diameter varies in different seasons when the cotton is grown in the same fields and from the same seeds.

"The cotton plant in the various countries of cultivation presents certain differences and characteristics which are more or less apparent, but it is in the product of the plant, in the fibers themselves, that the most distinctive variations exist. To the naked eye the chief differences lie in the length, cleanness, strength and color. While strength can be determined by those who are accustomed to handling the cotton, the apparent characteristics which determine the quality of cotton are: (1) Length of fiber; (2) Fineness; (3) Color; (4) Cleanness; (5) Uniformity; (6) Strength; (7) Elasticity.

The microscopical characteristics are: (1) Natural twist; (2) Thickness of the fiber walls; (3) Density of fiber; (4) Uniformity (or otherwise); (5) Hollowness;

(6) Serrated edges.

"*Length of the fibers*: Not only do different varieties of cotton vary in length, but cotton from the same plantation and the same crop also varies. The minimum length of commercial cotton is about five-eighths of an inch, while the maximum is about two inches.

"*Fineness*: Fineness is always a desirable quality. A fine fiber can be more easily and uniformly twisted than a coarse one, and a stronger and better looking thread can be obtained.

"*Color*: Deliveries of any particular class of cotton should be uniform in color, otherwise a shaded or streaky yarn will result. The colors of different cottons vary from a dead white to a rich, light golden tint, and for special classes of yarn the selection of cottons as to color is important.

"Old cotton and new cotton differ, the former being dryer, more brittle and weaker if not kept in proper moisture conditions. But if old cotton is kept in proper condition it is better than new.

"*Elasticity*: Dry, harsh fibers have little elasticity. The property of elasticity is necessary to enable the cotton to withstand the tearing and drawing actions to which it is subjected in the course of manufacture.

"*The microscopical characteristics* of cotton fiber are peculiar, but they open the road to a clear understanding of their necessity in rendering the material of commercial value. The fiber is one long, flat cell or tube closed at the apex. It shows many convolutions (165 to 300) with the outer walls thicker than the center. The density or opaqueness, the number of twists, and the thickness of the walls vary in different varieties. The serrated edges are formed by the natural convolutions, and these cause the fibers to interlock with one another, thus giving the yarn cohesion and strength.

"When we take into consideration the great delicacy of the cotton fiber and the phenomena of its physical structure, it is easy to understand that the utmost carefulness must be extended to it in its application to technical purposes if its essential characteristics and properties are to be retained in any proportion to their original and natural quality. Under ordinary circumstances of manufacture only slightly over 10 to 15 per cent of the strength can be utilized; and in cases where the material to be converted into yarn has been operated on by imperfectly worked machinery or where the productive capacity of the various machines has been taxed beyond a proper limit, then only about 5 to 10 per cent of the fiber strength is left available for the constitution of the yarn.

"The cotton buyers, provided they possess the knowledge of the working of the material, should be responsible for the quality of the yarn and they will have the greatest interest in obtaining cotton of the best quality for the price which they can afford.

"In the outside commercial transactions of a cotton mill the buying of cotton is by far the most important and requires a discriminative power which can only be gained by study of the peculiarities which characterize the different varieties of the cotton plant. Successful cotton buying is as essential to the success of a concern as good and economical management.

"*Cheap Mixings*: Practically the object of mixing different cottons together is to make the cost of the cotton as low as possible. Like everything else, it is at times carried to excess and always with disastrous results. With a poor mixing it is impossible to make a good yarn and the attendant consequences in the working are: (1) Increase in waste; (2) loss in production; (3) more labor in keeping the machinery clean; (4) loss in wages to the employees, and more work; (5) general discontent throughout the mill.

"In these respects the responsibilities of the cotton buyer are very great and can only be fully appreciated by those directly interested.

"The way to secure a high degree of perfection is to receive as uniform a cotton as possible, but not too high a grade. Care must be taken to see that the strength of the staple is good and that it does not contain too many unripe fibers, especially if the yarn or cloth is going to be dyed a light shade. Early arrival of cotton is to be avoided where perfection of yarn is required. Early pickings always contain more unripe fibers than that of later picking from the same field and it has not taken its natural curl.

"Superintendents are frequently unreasonably blamed when the quality of the yarn falls off, or shows an unaccountable decline in price, when perhaps an inferior mixing has been supplied to them. On the other hand, some of them are ever ready to blame the mixing for defects in the yarn or insufficient production when perhaps the supervision exercised has not been all that it might have been. An expensive mixing is costly, but one of a quality insufficiently good to produce the class of yarn required is infinitely more expensive in the end. Having to reduce the speed of the front roll as well as the spindle speed both affect the cost of the yarn or cloth.

"Of late we have heard a great deal about the high density bale and that the pressure in baling will damage the fiber, but so far as I have been able to observe, in my association with cotton, I have been unable to attribute any damage to the fiber in baling. The strength of yarns produced in mills situated near the cotton fields and by others using cotton which has not been pressed is not found to be any greater than that of yarns in mills using compressed bales when proper treatment has been given to it. The pressure made by the pickers or in slubbing, or even in spinning, is greater on the individual fibers, and in process in the mill where you find a lot of white dust around the machine you will find that it comes from damaged fibers which have been ground to powder.

"If the amount of moisture present in the air can influence the count of yarn to such an extent as to show an actual 40's yarn as 39's on a humid day, and 41's yarn on a dry day, to influence the strength of cloth from 12 to 18 per cent, and possibly more, it would seem unreasonable that exceptions should be taken to goods which fall short of a contract or specifications by these amounts unless reliable tests have been carried out under stated and agreed conditions of humidity.

"The average length of several of the Egyptian cotton fibers ranged from 1¼ to 1⅝ inch and the diameter 1/1300 to 1/1500. The excellence of the Egyptian growth is attributable to the length, strength, and fineness of the fibers and to the absence of the great variation in fibers comprising their staple, as well as other features, also the manner in which the fibers are pressed together under the influence of twist enables the production of yarn with the use of a lower twist coefficient than any other cotton, with the ex-

cepion of Sea Island. In good body American cotton 14,000 to 20,000 fibers weigh one grain, hence one pound of cotton contains 140,000,000 fibers, which, if placed end to end, would reach 2,000 miles. Fibers in the cross-section of 40/1 yarn, American, 1⅛ inch amount to 129 fibers; 40/1 Egyptian Sakellarides cross section, 160 fibers; 40/1 mule yarn, Egyptian Metififi cross section, 160 fibers.

"Calculated strength .....236 lbs.
Observed strength ..... 51 lbs.
Percent strength used 22
Per cent strength lost 78
40/1American mule, cross section .....129 fibers
Calculated strength .....195 lbs.
Observed strength ..... 40 lbs.
Per cent of total utilized 21
Per cent of strength lost 79

At the conclusion of his prepared remarks, Mr. McDowell said: "Now, men, I have here two samples of cotton. The one in my right hand is of good spinning quality, the one in my left hand will not lend itself as readily to the spinning processes."

Holding up the cotton in his right hand, he continued, "Now, I want you to listen to this cotton, and if you will be very quiet and listen closely, you will hear it sing." The speaker took this piece of cotton, holding it by both hands and breaking it slowly. The audience listened, and those nearest the speaker could hear a very slight sound which might be compared with that of a soft wind.

Then Mr. McDowell took the sample of cotton that in the first place he had held in his left hand and which he said would not lend itself as readily to spinning, and broke it in the same way. He asked if anyone could hear it. No one said he could. Then in explaining this, Mr. McDowell said, "The difference is, if you take the cotton that I showed you first and spin it into 20s yarn, and then take the other cotton that I showed you secondly, and spin it into the same count of yarn, taking out the same amount of waste and putting in the same amount of twist, the first will give you four pounds better break. Now if you paid 35½ cents for the poorer, and 36 cents for the better cotton, and you put five turns more in on your front roll when spinning the better cotton, which would be the cheaper? You get fifteen inches more every minute on every spindle you have running. Isn't that some advantage?"

Mr. McDowell then invited questions and discussion on either the stereoptican pictures shown during his talk, or any problem whatsoever in connection with the subject of cotton.

The first question asked from the audience was, "Do you find that Texas cotton has the least convolutions?"

"No," replied Mr. McDowell, "convolutions vary. This year's cotton from Texas might have the least, and at another time, the most—it all depends upon conditions; whether this place has had a dry season, whether that place has had a wet season; also the methods of cultivation and many other things."

"What is the limit of moisture content that yarn will stand without moulding?" If the cotton contains over nine per cent it will mould because of the oil and cellulose in it, replied Mr. McDowell.

What difference in the breaking strength of a strand of 20s yarn would be obtained by an increase of one per cent in the moisture content, was the next question.

"One per cent increase in the moisture content of 20s yarn would give you about 2½ pounds better break," replied Mr. McDowell, adding that when he referred to breaking strength he meant breaking lees and not single strands. "If you tested a 20s yarn having six per cent moisture and then tested the same yarn with eight per cent moisture (isn't that your idea?) you would get more than 2½ pounds, due to the natural moisture and humidity you would obtain about 3½ pounds better break."

A member of the audience said next: "In your slides you show three pictures. Two of these illustrate the correct piecing of yarn, and one the improper, which shows an operative piecing yarn with her fingers pressing the two pieces together, and you make the explanation that in all probability her hands are unclean and oily, and no matter how hard one might try, this stain cannot be removed from the finished cloth. The proper method as shown by the slides is for the operative to piece the yarn by overlapping the broken piece for a distance of about 2½ inches over the material going through the machine and it will adhere itself, thus eliminating the possibility of the stain. Do you think you could get help to piece in that way?"

"I have tried this in one mill, and it is now being done that way," said Mr. McDowell. "We find that this method increases the strength of the yarn one per cent."

"If you tried to bring out something of that nature in Fall River you would have a strike on your hands," commented a member of the audience.

Another man asked Mr. McDowell if he would explain a little more fully just how the proper piecing was made.

Mr. McDowell said he would demonstrate with the cotton in his hand, and taking two pieces of sliver, he illustrated the method by placing one piece over the other for a distance of about two inches, and then held up the piece mended. "You see," he explained, "there is no need of pressing or rubbing the two pieces together in order to make them adhere to each other. The natural tendency of cotton fiber to cling to each other takes care of that. This method does away with thin places. Thin places in the yarn means thin places in the finished product. If you had too many such thin places in a piece of cloth, wouldn't it be rejected as defective?

"The day is coming," continued Mr. McDowell, "when we are going to size yarn by diameter and not by weight. Steel is sized by diameter, and it will not be long before the same is done with yarns. This will cause us to be more careful of these thick and thin places in yarns as it will be necessary to keep nearer to the standard."

"Mr. McDowell, you state that cotton in processing loses about 75 per cent of its strength," recalled one man, "but you do not say anything in relation to the different machines that the cotton passes through, how much of the natural strength of the cotton is lost at each machine. Can you tell that?"

"I am experimenting on a machine to do just such work as that," answered Mr. McDowell. "I have a machine being made now that will show this. It is my desire to be able to tell the man in the picker room how many broken fibers were contained in the cotton before it reached him and how many broken fibers were in the lap when it left his room, to tell the man at the card how many broken fibers in the lap at the back of the card and how many broken fibers in the sliver as it comes from the card, and

the same way all the way through the mill."

Taking up the subject of combed and carded yarns, Mr. McDowell continued: "In combed yarns there is just as many defects as in the carded. In combed sliver there are just as many defects as in the carded sliver that went into the comber. When yarn breaks there is only 7½ per cent of the actual fibers that break, the rest all slip by."

"Why is it then," it was asked, "that combed yarns will break better than carded yarns?"

"Do they?" queried Mr. McDowell. "It has been proven that carded yarns will break stronger. Remember, you are not carding cotton when you put through 700 pounds in a 48-hour week; you're just putting cotton through a carding machine."

Someone asked Mr. McDowell his opinion of the relative merits of the Kirschner beater and the plain beater in the picker.

"It breaks more staple," he answered. "The neps that you see in the yarn are all put in by the machines in the mill, they are not in the cotton when it comes to the mill. The day is coming when we are going to clean all cotton by air and not by pickers at all."

"Have you ever tried that?" a man asked.

"Yes, but the trouble that you will run up against is that when trying to eliminate any machinery in the mill you are up against the machinery builders," replied Mr. McDowell. "I state that you can cut out one-third of the machines in the mill and make satisfactory and even better yarns. I have had yarns in my laboratory that have been made by hand and you have not a mill in America that makes more even yarn than that is."

"How even do you think your yarn would be if you sized it inch for inch?" was the next question.

"Well," Mr. McDowell answered, "at least 65 per cent of it would be off standard. Tomorrow when you are sizing, take a piece off and wrap it around a yardstick, take five yards and weigh it, and do the same 25 times during the day, and I am sure you will find that 65 per cent will be off standard.

"We are too careless in our manufacturing. For instance, I had a piece of cloth that was sent to me to examine because the dye would not penetrate. In examining this cloth under the microscope I found that the reason for this was that the sizing was still on the material.

"There is enough yarn coming to New York every Monday morning from England to keep New Bedford and Fall River mills going for quite some time. Why is that when New England mills try to construct a cloth similar to those manufactured in England, they try to make it a cheaper quality and sell it at a cheaper price?"

"In spinning yarn, should you try to keep it as near as possible to natural humidity?" was next asked Mr. McDowell.

"The natural humidity is eight per cent," he answered, "we put cotton into the picker room at four per cent, in the next process it takes up a little, the card room may contain a little more moisture and the spinning room a little more. It would be better to reverse this process and start the cotton in the picker room at ten per cent and work down to the natural humidity."

"But can you run cotton through the picker with ten per cent moisture in it and clean it?" someone asked. "Well," said Mr. McDowell, "dirt is heavier than cotton." He tossed a sample of cotton to a member of the audience and asked him how much moisture he thought was in it. The man said "About four per cent." "No," said Mr. McDowell, "there is six per cent. The trouble with us here in America is, because our grandfathers bought certain cotton we must buy the same thing. I know certain mill treasurers in Boston who buy their cotton of just certain people, and why? 'My grandfather bought of these people!'"

A man, referring to a previous statement by Mr. McDowell, asked him what machinery he could discard in the mill and still get good results in the manufacture of yarn. Mr. McDowell said, "I think you could get along with one set of pickers and about one-half of the doublings you now make."

"But how could you get uniformity?" the man asked.

"Do you get uniformity now?" countered Mr. McDowell. "If some of the wire on the cylinder of your card is damaged and makes a thin place in the sliver at every revolution of the cylinder and that thin place is going into six cans, when these cans are being emptied those six thin places will all come out together.

"Some time ago I ran some yarn using about one-half of the machines that are ordinarily used in a mill, and how much stronger do you think the yarn broke than what the regular yarn would?"

"About four pounds," suggested a man.

"No," laughed Mr. McDowell, "if it had I think I should have taken a chance at changing over all our mills. I did gain 1½ pounds in the strength of the yarn I tested. I made my tests on 20s yarn as this is the standard I run."

"Which takes dye better, filling yarns or warp yarns?" was next asked.

"Warp yarns are naturally sized," replied Mr. McDowell. "If you use the chemicals that 99 per cent of the mills are using today, it does not come off. The twist also has something to do with the dye. If the yarn you are using is not right, no one will be able to make it right, just the same as with cotton coming into your pickers; if it is not right you can't make it right. Likewise the best carder in the world can't do good carding if he does not have the proper material. If you want good yarn, you must use good cotton."

"How does Pima cotton compare with Metififi?"

"It will not break within five pounds of Metififi," said Mr. McDowell. "The fiber of Pima cotton is larger in diameter than the fiber of Metififi and it is the number of fibers in the cross-section of yarns that gives the strength to the yarn, and if you cannot get as many fibers in the cross-section using one kind of cotton as you can in another, the first is going to be the weaker yarn. The more fibers in the cross-section, the stronger the yarn."

This practically concluded the discussion and the meeting was adjourned, the next to be held on December 5th, to discuss card room problems.

Saco-Lowell Shops announce they have secured the sole agency for the Wardwell type ball bearing top rolls for use on drawing, roving and spininng frames. These rolls are interchangeable on the frames with both solid, shell and ball bearing rolls formerly handled by this organization, it is pointed out, and the shells on the Wardwell type are also interchangeable with the shells of these rolls.

Glazing Yarn

BY C. H. HARPER

This treatment of the yarn is sometimes called polishing, or dressing. The primary object of glazing is to get a smooth finish and to eliminate all loose fibers from the finished material and also to stiffen and strengthen the thread by the same process. It is plain that if all the fibers which enter into the thread are packed together and held in that condition by the sizing or glazing substances that we get the full strength of each individual fiber. The yarn gains by this process, from 15 to 20 per cent in weight on black and colored yarns and from 7 to 10 per cent on white yarn. If a certain count of glazed yarn is needed for any purpose, allowance must be made for the increase in weight of the thread. If yarn is bought in the natural state and dyed, then put through the polishing room, the increase in weight will offset all cost of labor and expense and there will still be a balance to the good, to say nothing of the increase in price of the glazed yarn over the natural yarn. The glazing treatment also increases the strength of the yarn from 15 to 35 per cent, depending, of course, on the amount of size and ingredients put in the yarn.

The general types of glazing machines are the single, double and three-brush machines. The double- and single-brush types are the ones most commonly used. The brush section of the machine has one or more cylinder brushes revolving at high speed, which act to lay the fibers as well as adding luster and strength to the thread. The thread to be processed is placed on spools on a creel in front of the brush frame and is fed through eyelets placed on a bar which traverses back and forth just in front of the soapstone rolls at the feed end of the brush machine, then in turn passes through or between the soapstone rolls, which are covered with cloth. Directly under the rolls is a size box, the lower roll passing through the sizing or polishing solution and carrying it to the thread. From the soapstone rolls the thread goes over a grooved wooden roll which is operated back and forth by a cam, giving a sidewise motion across the brushes. Steam coils are placed under the brushes, serving to dry the thread while passing through the machine. After leaving the brushes, the thread passes under another wooden roll and through eyelets direct to spools on the take-up, which usually has 98 spindles. The spools are placed on spindles on the take-up and revolved by a cord or band passing around a whirl on the spindle, around idlers, and around a drum at the back of the take-up. There are two drums, each driving half the spindles. The drums being perpendicular, are driven through bevel gears from a shaft driven by a belt from the brush machine. In front of each row of fourteen spindles on the take-up there is a bar with an eyelet for each spindle which guides the thread to the spool. These bars are held by a frame on each side of the take-up. The frames are operated up and down through a cam, which allows a traverse of from three to eight inches. This cam is operated through bevel gears. On one end of the bevel gear shaft is a small spur gear which is revolved by a barrel mangle, made so that the small pinion travels on the outside when the guide bars are going up and on the inside when going down.

The mangle is so shaped that the travel is slower in the center of the spool and faster at each end. This gives a barrel shape spool, thereby allowing more thread on the spool and tending to prevent sloughing off of thread. The soapstone rolls of the brush frame are driven by three-step rope pulleys from the shaft on the brush machine that drives the take-up. Tight or loose pulleys for driving are placed on the outside of the brush shaft, which is fitted with ball bearings. On a two- and three-brush machine the brushes are driven from one to the other by a belt.

The single brush machine is used for fine yarns which will not admit much tension, nor much brushing of the yarn itself. The brushes on the machines are made in lags or strips the width of the machine, each lag being four to five inches wide on the face of the bristles. A soft pliable bristle is generally used on the single brush machine and also on the two- and three-brush types, if they are intended to run single yarns, otherwise a coarser and heavier bristle is used. Take the heavier varieties of yarn, such as coarse singles and two, three and four ply, the regular type for the thread and polished yarn grade is the double-brush machine. For yarns over 30/1 the single-brush type is generally used and for extra high polish the three-brush machine is used. The two-brush machine is almost wholly used in the thread business. As stated, this type has 98 spindles and a creel that will hold 98 spools. The take up part of the machine consists of seven banks of spindles; starting at the back bank, each row is set back a little more than the diameter of the spool, usually about 4½ inches, so that the top row of spindles stand back about two feet further away from the brush frame, than the bottom row, leaving plenty of room for the operator. In commencing to thread this machine, the operator starts in the center of the machine, taking the central spool of yarn he is about to dress. He finds the central screw eye or guide on his machine, which would be the 49th from the end eye, carries the yarn under the bottom size roll and up between the rolls, squeezing out any superfluous size, then over the grooved guide rolls and brushes to the take-up. Here he takes either the top or bottom spindle of the seventh row, works up and down and follows the line of spindles he started with to the last one. Threading the next on the same bank he takes that row down, working from top to bottom and bottom to top rows until all are filled. This method of threading allows the operator to reach any spool of the 98 without disturbing the others. The spindles are driven by a long band carried once around the cylinder and to the spindle, then back to the cylinder and around No. 2 and so on until there are seven spindles on the same band, or half of one bank of spindles. The whirls of the spindles being set so that each successive band is a little higher than its neighbor, the band runs around the cylinder for each spindle, giving plenty of tension on the yarn. The tension on these bands can be adjusted closely by an idler on a thumb screw, working to and fro in a slide allowing the operator to tighten or slacken each individual band as required, as the spools get heavier and consequently require more power to drive them.

The brushes should be run at about 375 to 400 r.p.m. As the brushes are 18 inches in diameter, that speed will give a polishing surface speed of 1,800 feet per minute. The yarn is in contact with the brushes for a surface of nine feet, and the amount of polish obtained depends on the speed at which the yarn travels over that distance. If, however, the yarn runs through too slowly, the bristles will begin to brush the fiber away, destroying the polish or glaze. The materials used in the size are then brushed off the yarn that is carrying them. It is the usual practice for a dresser tender to operate three machines, each with a take-up of 98 spindles. If a machine is equipped with a V creel, it is usually counted as two machines. A V creel is set in the shape of the letter V, the apex of the V being in the center of the size rolls, and holding 98 spindles on each side for the purpose of dressing two ends together. This is generally done at the expense of the polish, unless the three-brush machine is used, when the two ends can be thoroughly dried and polished. The two ends going over the size together carry a large amount of moisture. On a two-brush machine this increases the difficulty in drying the yarn thoroughly, making it necessary to keep the temperature of the room well above 100 degrees. The three-brush machine is generally used on all two-end glazing, thereby getting better results and far less waste of yarn. On a two brush machine, the yarn is apt to be damp and then as it dries on the spool it becomes matted into a solid mass of yarn and size, which has to be cut off and wasted. The three-brush machine prevents this waste and also requires less attention. The temperature of the dressing room ought to be not less than 100 degrees to get the full production from the machines. This heat is necessary, because the yarn must be thoroughly dry before it reaches the spools on the take-up. The production from these machines varies widely in weight with the count of yarn, but the length that is run can be easily computed. One pound production per spindle on 20/2 for one day 10 hours is a general average of the production.

The regular types of machines, just described, have grooved guide rollers, around which an end wraps should one break during processing. Care should be taken, however, in removing the thread from around the roll. Threads on the brushes should be held by means of a piece of card clothing set with about 36 teeth to the inch, three or four feet long. The teeth should not project more than ⅛ inch. It should simply scratch the surface of the brush, catching the broken threads which the operator can clear away. These cards should be used by hand, and never fastened on wood, or any other material as that destroys the elasticity, and causes more force to be used than is necessary to clear the broken ends, rapidly ruining the brush and tearing out the bristles.

Glazing is very similar to slashing, since each overseer has his favorite formulae and methods of operation. Probably the most difficult part of polishing is the preparation of the size, since the ingredients play an important part on the finish of the yarn and care must be exercised in mixing. For a hard finish on the yarn corn starch is commonly used. The corn starch granules are of smaller size than the potato starch and consequently have more penetrative power. Corn starch also boils into a far more liquid condition when hot than potato starch does. For a medium or soft finish, the potato starch with a little softening is used.

A good formula for two-ply yarn is as follows, for 65 gallons:

20 pounds potato starch
50 pounds rye flour
1 to 2 pounds paraffin wax
½ pound gum arabic.

For a hard finish substitute corn starch for the potato and add ½ pound more glue. For a soft finish add ½ pound stearic acid, 1 pound tallow and a bar of common soap; any oil can be used for softening. If the size is not to be used quickly, add two ounces of copperas or copper sulphate to each tank to prevent souring. If the size is to be used for white or colored yarns use cocoanut oil. The wax and gum are boiled together with a couple of gallons of water until thoroughly dissolved. The tank is then filled ⅔ full, the starch which has already been dissolved in cold water, is entered. While the mixture is being stirred, the flour is sifted through a fine mesh sieve into the solution, which is constantly stirred with a wooden paddle until it boils. Boil ten minutes. In using this mixture dilute with one part hot water to two parts size, which puts the solution in good liquid condition for the size box.

To get the yarn in good condition for polishing, care must be taken in the spooling room, that the traverse of the bobbin is completely and evenly filled. The tension of the yarn itself will pull the spool around in the creel without the yarn running under at the end of the traverse. There is a certain amount of drag on the yarn from a V creel every time it travels to the inside edge of the spool. If the spool is not filled evenly the yarn will snap off. The exercise of a little care in the spooler room prevents a great deal of breakage of ends and waste of yarn in the glazing room.

A fifty gallon oil barrel or other container of this capacity makes a convenient tank for mixing size. A steam pipe should be connected to extend nearly to the bottom of the barrel to start the mixture boiling from that point and should be so arranged that it is easily disconnected when the barrel is to be cleaned.

A formula for moderately coarse thread is the following: 120 pounds of potato starch, 30 pounds of rye flour, 12 pounds of paraffin, 4 pounds of glue, to make 400 gallons of size, together with one pound of china clay and three pounds of salsoda. When mixing any of these solutions in which starch is to be used, the starch must first be dissolved in cold water. This is also true with regard to china clay or prepared chalk, if an attempt is made to mix either or both in hot water, the mixture will not be smooth, but will have a grainy or curdled appearance which cannot be overcome with continuous boiling. Starch should be the first of the ingredients dissolved. It is vitally important that this be done thoroughly, or, when the liquid is boiled, any undissolved lumps of starch will become hard with the application of heat and will not dissolve, which will result in a lumpy solution, containing insufficient starch.

Glazed yarns are used for many purposes, among these being the electrical trade, broom twine, mattress twine, wrapping twine, sewing threads for the shoe trade, artificial leather trade, fancy lace threads, rope trade, and there is probably a score of other outlets, too numerous to mention. Different counts, finish and grades of yarn are

required in almost every outlet, for instance, mattress twine must be made from a very good grade of cotton, with light twist, highly glazed, and must be soft and pliable. While wrapping twines usually are made from a low-grade cotton, but must have a very high glaze and pronounced stiffness. Shoe sewing thread is commonly made from combed yarns, and must have a soft finish and not necessarily a high grade.

The usual spinning twist multiple employed on glazed yarns is 4.50. This twist factor allows for a little stretch, enlargement of the yarn, and prevents the most usual kinky places in the thread.

One of the biggest uses for polished twine is in wrapping twine, and in polishing and dyeing this twine, arises the feature of glazing, for the twine is dyed and glazed in the same bath. These twines are usually of a brilliant color, without fastness, so the dyeing and glazing can be effected by the same solution. The dyes used for this purpose are basic, such as: chrysoidine for yellow and orange; fuchsine for red; bismark brown for brown; methylene blue for blue; mythel violet for violet, and others. All these may be mixed together for making compound shades. In using these dyes the following solution is necessary:

Dyestuff ..... 8 ounces
Acetic acid ..... 5 ounces
Water to make one gallon.

This dye solution is added to the sizing compound after the latter has been made, and has cooled well below 170 degrees F. If a small amount of some fatty acid is added to the mass there is a possibility that the colored sizing will be more uniform in shade. Soap is not desirable in such a mixture, for, when the acetic acid of the color solution comes in contact with the soap, a decomposition takes place setting free a liquid fatty acid that impairs the luster of the thread. This dyeing and glazing is effected successfully only after careful experience and knowledge of the chemical properties of the various ingredients, but when carried out correctly a highly glazed yarn is made, for which a profitable price is obtained.

Southern Carders Meet at Charlotte

Helpful in its discussion of carding problems, and in its presentation of subjects for further consideration and test, the meeting held by the Carding Division of the Southern Textile Association, at the Chamber of Commerce, Charlotte, N. C., on Wednesday, December 5th, was indeed a success.

A splendid attendance, in spite of very inclement weather, was an indication of the increasing interest being taken in these meetings. The number present possibly equalled the attendance at any previous sectional meeting. And those who came weren't disappointed in the discussion or entertainment—as the following seriatim report of the meeting will prove to the reader.

J. O. Corn, superintendent of the Pacific Mills at Columbia, S. C., presided at the meeting as chairman of the Association's carding division, and acquitted himself in a commendable manner as a discussion leader. This was the first meeting to be conducted by him, and he was universally congratulated upon his method of operating it.

In opening the meeting, Chairman Corn called upon James A. Chapman, Jr., president of the Association, for a few remarks. Mr. Chapman succinctly struck the keynote of the sectional meeting idea, saying in part: "I think we have made some pretty good strides in these discussion meetings. I know I went in the mill business as a young fellow without much experience, and I feel that my ability to hold my job has been due to the fact that I have attended these meetings and gone back and tried to put into effect some of the ideas I got from them. Now what you get out of these meetings depends on what you put into them. If you are not willing to get up and ask questions you are not going to get your question answered unless somebody else happens to ask the same thing. I know over in Gastonia two or three years ago we had a lot of those fine yarn spinners there, and Mr. Harris was there as chairman of the spinning division. But none of our old 'standbys' was there, and we couldn't get that crowd to talk. I told Harris if he'd ask a question about variation in yarn numbers, that I'd make a fool of myself, and he did, and I said 'Yes, I've run some tests on that, and I find that if I get down to twelve per cent I'm doing good, but it generally runs around fifteen to twenty per cent.' You know, that crowd thought I was plumb crazy, but when they went home and tested their yarn they found out I was nearer right than they were; they were talking about variation on section beams, and I meant the variation on the bobbins." Mr. Chapman emphasized that his idea was that none of the men should be afraid to tell something, or to ask a question about any point of interest.

Marshall Dilling, vice-president of the Association, was the next speaker. He, too, emphasized the need for free participation in the discussion, and mentioned the wonderful spirit of cooperation and helpfulness that has resulted from the sectional meetings.

Following Mr. Dilling, the chairman began the discussion. He further urged the men to take part in the meeting, pointing out that while "something may have been your custom for a long time, it may be something entirely new to the rest of us, and therefore helpful." He indicated a desire to determine just what had been accomplished in the sectional meetings, and asked the question, "How many of you have changed your method of mixing since 1921; was it some suggestion at one of these meetings, or something you saw published in one of the textile papers, that gave you an idea of making a change?"

A. F. Briggs, superintendent of the Osage Mfg. Company, at Bessemer City, N. C., responded as follows: "We were mixing by opening the cotton and feeding it from the bale and piling it in a pile on the floor a day's run ahead. We changed the system and put in a No. 4 breaker and feed from ten bales now. It gives us a better mix. What caused us to change was the reports that the new way was better."

"You have a No. 4 bale breaker," said Mr. Corn, "and you opened up on the floor before but now you do not do that any more. Do you consider you get as good results by running direct from the bale as by opening up a day ahead?"

"We try to keep six or eight hours ahead," said Mr. Briggs. "We open it in the opening room, and can stay about six or eight hours ahead." "Did you open the bales before you fed them to give them a chance to air?" asked the chairman. "Yes," was the reply.

"At Merrimack we had a great deal of compressed cotton," said G. W. Lehman, overseer carding, Merrimack Mfg. Company, Huntsville, Alabama, "and we had a man in there to shake that cotton, but it was impossible to shake it loose. On account of the space we could not get over four hours run ahead of the opening. But we have made what we call an opener—made it ourselves—the apron is 84 inches wide with a spiked roller. We throw the cotton in and it tears it up and we run about six hours ahead of the opening room. This machine will put through 20,000 pounds a day, and we find that one man with it can do what three men did before. Our laps are evener and numbers do not vary so much." From this machine, said Mr. Lehman, the cotton goes to the hoppers and then to the conveying pipe.

"Was your cotton compressed, Mr. Briggs?" asked the chairman. "Part local and part compressed," said Mr. Briggs, and this led to the following general question by the chairman: "How many are using compressed cotton altogether or use it at times?" About a dozen indicated they were using it, and one of these, L. H. Miller, carder, Limestone and Hamrick Mills, Gaffney, S. C., when called upon for his method of mixing, said:

"It seems that these men are leading right up to something that I am mighty interested in. We have two different systems. One mill is equipped with the vertical opener and the other is not. In the mill where we don't have the vertical opener we mix thirty bales, two stacks run us a week—and the cotton gets to age about three days. In the other mill with the vertical opener we run compressed cotton and we open twenty bales on each side of the room and just as soon as we get the floor clean on one side we open cotton and let it stand before running. The two mills have practically the same equipment, and in the mill where we mix the cotton by hand and it stands we get decidedly better results than in the mill where we have the vertical opener. Now it may be in the man and not in the machine, but we have practically the same machinery in the two plants and we get much better results where we mix it by hand and let it stand for three days and nights. Less variation and better running work, better production in the weave room and better speeds in the spinning room by four to eight turns on the front roll."

T. W. Harvey asked if the same grade of cotton were used in both mills and the reply was in the affirmative. He next asked "Where do you find your trouble?" and Mr. Miller said, "We locate it in the weave room; we do not get as good a speed in the mill with the vertical opener." Mr. Harvey asked if he had tried various settings of the grid bars in the opener. "Yes, sir," was the reply. "How do the laps compare?" asked Mr. Harvey. "We are getting a much better finisher lap where we are mixing the cotton by hand," replied Mr. Miller, and continued: "However, there is some little difference in the lay-outs. In the mill where we mix by hand we have an opener, breaker, intermediate and finisher, with four beating processes, and in the other mill we have the vertical opener, and two beatings."

"How does the strength of the yarn compare," asked Mr. Harvey. "We get better breaking strength where we mix by hand," said Mr. Miller. "How about your card settings?" suggested Mr. Harvey. "Same thing," answered Mr. Miller, "same kind of machine, same everything."

Mr. Harvey next asked Mr. Miller if he has the evener motion on the breakers in the mill where the cotton is mixed by hand. "No, sir," said Mr. Miller, "we haven't; but we do have the automatic evener in the hopper."

"I think you will find the trouble in the pickers," suggested Mr. Harvey. "If your equipment is the same throughout the two mills, and yet you get a better breaking strength in one, then evidently the trouble is in the place where you start to work. Are the beater speeds and settings and grid bar settings the same in both mills?" "Yes, sir," replied Mr. Miller, "they are the same."

"The only difference, then," commented Mr. Corn, "is in his picker room; he has four beatings in one and two in the other. That brings up a point for discussion: By having a different lay-out in the picker room there is a chance of offsetting your mixing. The main point I was after is, if there is anyone here who has changed his method of mixing, leaving the same machinery throughout the mill with the exception of just the opening of the cotton, we want to hear what results he got. It is customary whenever you adopt the No. 4 bale breaker or vertical opener to make some other change also."

Answering this specific question, Mr. Chapman said, "I will state that last summer we were running compressed cotton—and I'm not proud of the way it was running at the time—so we took all the compressed cotton that we could get in the warehouse and took the ties off of it and let it lie. We found that it helped very materially and the work picked up as if we had changed the grade of cotton. We have the bale breaker, three vertical openers in tandem, and then two processes of picking with eveners on our breaker picker; we have three beatings there.

"We think when we put in the vertical openers we got a great deal better results. Our work looks cleaner. It began taking out so much waste that I got scared about what the boss would say when he saw it, but right now I wish I could get out some more." In explaining his desire, Mr. Chapman pointed out that even though the vertical opener seems to take out an excessive amount of waste, in reality there is no change in the amount of waste taken out through the entire mill; and stated that what he wanted to do was to get it out as soon as possible before it got any further along in the succeeding machines.

H. H. Boyd, general superintendent, Chadwick-Hoskins Co., Charlotte, pointed to the inequitable conditions existing in the mills of Mr. Miller, explaining that the difference in the number of beaters and eveners did not allow of a fair basis of comparison.

"That's why I wanted the comparison after changing only the mixing process," explained Mr. Corn.

At this point, David Clark, of Charlotte, called attention to the fact that at several meetings he had made the statement that the English spinners use single roving almost universally on the coarse and medium numbers. "Last summer J. S. Drake was in England, and wrote and asked me if there was any particular point I would like to have him investigate. I asked him to make an investigation of the use of single roving by English mills. Drake made the

investigation in the section that uses American cotton, and wrote me, and told me after he returned, that he did not find a single mill in England spinning American cotton of ordinary length using double roving on 50s or below, and that he found a number of mills making 60s and 70s from single roving. They use the Crighton opener, they age their cotton, and then they clean it. I do know that the English Yearbook doesn't carry one organization on 40s or below with double roving."

B. M. Bowen, superintendent of the Salisbury (N. C.) Cotton Mills, said that "formerly we opened our cotton and put it in the hoppers from the bale. In 1921 we enlarged our opening room and open it up a day ahead—we open up today what we will use tomorrow; they're using today that which they opened yesterday. We run 24s warp and 22s filling, single creel, and before the change I noticed we had a great deal more variation in breaking strength and number of yarn than we do now. I think that is one of the greatest things we have done." Reverting to Mr. Miller's problem, he said, "I would like to ask Mr. Miller which one of his laps, or work, does he consider the cleaner, the hand-fed or the one from the vertical opener?" The one from the hand mixing is cleaner, replied Mr. Miller; "we have four beating processes in that organization."

Mr. Corn asked Mr. Miller what system was used in the newer mill before the installation of the bale breaker and vertical opener. Mr. Miller replied that it was the same that is used in the other plant, but in reply to a further query from the chairman, stated that he did not have the records on the mill with this organization, and therefore could not state whether the breaking strength dropped or the number variation increased when the bale breaker and vertical opener were installed. In response to another question, he stated that the speed of his vertical opener is 650 r.p.m.

At this point Mr. Corn brought out the fact that only one report had been made—that by Mr. Chapman—in which only the mixing method had been changed, and said, "I think that is a point that might well be studied. We have been discussing mixing, mixing, mixing for the last three or four years, but in most every instance where they have changed the mixing they have changed some other process and cannot attribute the results directly to the mixing. I realize that many of us are not so situated as to be able to do that, but it would be interesting if we could hear more reports of this kind at the next meeting."

W. P. Campbell, overseer carding, American Spinning Company, Greenville, S. C., asked if "when you open the cotton and let it age, does the humidity affect the cotton?" that is, he explained, when a damp day or a dry day comes along while the cotton is ageing. "Two years ago I tried mixing my cotton one day ahead, and in damp weather my laps would get on the heavy side. Then if my picker man lightened up and the weather cleared off, my numbers would be on the light side, so I went to mixing from the bale direct, from the bale to the bale breaker to the vertical opener, and I find that my numbers do not vary half as bad, and I run half compressed and half soft cotton. Damp weather did affect mine when I opened up a day ahead."

"Well, I can't answer that directly," said Mr. Chapman, "but it looks to me if the change in humidity would affect all the cotton alike. Didn't you find that they all contained about the same amount of moisture? One bale wouldn't have ten per cent and another eight per cent in it, would it? Wouldn't they all have eight per cent or whatever it was?"

"When we take it direct from the bale," said Mr. Campbell, "we get the same percentage of water in the cotton, but when we put it out and let it lie it absorbs more." "Then what would you do when a bale was baled during a damp spell or when it was baled during a dry spell?" asked Mr. Chapman.

"Compressed cotton contains about eight per cent and holds it," said Mr. Harvey, due to the density with which the cotton is packed, "and when you put it up and expose it to the hot air and sun, you allow a great deal of that to dry out, and it's the same way on a rainy day. The picker room will have the windows up and that cotton absorbs

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more moisture. If the man who is running the picker room undertakes to change his laps on a rainy day, if it clears off the next day he has gotten something out of his laps that he can't put back, and when the lap gets to the card room you have light work. For years I have instructed my picker men never to change laps on a rainy day. If it is running a pound heavy, keep it there for by the time they hit the cards it will be gone."

Mr. Corn suggested that an item of possible interest for the next meeting would be the amount of moisture that an ordinary mixing of average compressed cotton would contain.

Rogers W. Davis, southern agent, Saco-Lowell Shops, Charlotte, N. C., speaking as a manufacturer of vertical openers, stated that if Mr. Miller installed a vertical opener in the mill now using the hand mixing process, in addition to the system already in use, that a much cleaner lap would undoubtedly be produced. Mr. Miller explained his position and interest by stating that when the vertical opener was installed the mill was told that they could get just as good results, and "they expect me to do it."

Mr. Dilling asked where Mr. Miller's cotton went after passing through the vertical opener. "We drop it on the floor and pick it right up," was the reply. "I think that

is one feature that will have a considerable effect on it," continued Mr. Dilling. "Where he opens it by hand he has three days ageing, and I am very much convinced that if he will run the cotton through the vertical opener and let it age then, it will be very much better, because it has been torn up so much better than he can get it by hand; he will have an advantage in doing that."

"I agree with you there," responded Mr. Miller, "but we haven't got the space to do that. I am trying to get back to the point that when this vertical opener was put in we were expecting to cut out labor and get it through cheaper than we did before, but there is no doubt that we are not going to get the results out of one mill that we do in the other. If there is any way to remedy the situation without going to the expense of mixing cotton, I would like to find it out."

At this point Mr. Dilling requested Mr. Clark to read a clipping giving the account of the cotton mill to be built by the Ford Motor Company, because of some apparently revolutionary methods of manufacture to be included therein. Mr. Clark read this as follows:

"The raw cotton will go first to a bale breaker; next through two vertical openers, set in tandem, and then directly to the cards. Each of these machines will be fed automatically from the preceding machine and the cards will deliver the stock directly to the back of the drawing frames and thence to the slubbers.

"Those who are familiar with the cotton manufacturing process will observe two radical departures from common practice up to this point: first, the marked abbrevation of the process by the elimination of picking; and second, the avoidance of the handling of the cotton by human hands from the time it enters the bale breaker until it is delivered to the back of the slubbers."

Discussion on this was suggested, and Mr. Davis, of Charlotte, pointed out that the bare statement in the account, with reference to feeding the cotton directly from the vertical openers to the card, might be misleading to the men accustomed to the regular mill equipment; he pointed out that the plan is to have something on the order of a Bramwell feeder attached to the back of the card, which will prepare the cotton for the card. Mr. Harvey recalled that this system has been used for thirty years, he said, though not in the southern section of the country. He said that it is rather common in woolen mills, having some sort of attachment on the back of the breaker card for this purpose.

The next question put by the chairman was regarding speeds of the beater in vertical openers. Two men indicated they were running at a speed of around 600; one man said he is running his at 650 r.p.m. (This referred to vertical openers used singly.)

"I haven't changed the speed," said Mr. Campbell in this connection, "but I have experimented on raising and lowering the beater as to what percentage of waste I would get."

"What results?" asked Chairman Corn. "I found there was some difference; with it as close as I could get it it was about 1½ per cent," responded Mr. Campbell.

"In changing the beater, by raising or lowering it," asked Mr. Touchstone, "did you notice any difference in the condition of the cotton, with the beater far and close?"

"When it was as close as we could get it," was the reply, "it looked as if it was opened up better, but there were little strings that wanted to twist it, and when I got it off it did away with these little curls."

"Yes," said Mr. Touchstone, "if you run at very close you have a tendency to 'nip' the cotton, but if you get too far off you make it lumpy."

Another point brought out in connection with the vertical opener by Mr. Campbell was: "Has anyone experimented with the fan speed to the vertical opener?" "I have, with the one that draws the cotton from it," said Mr. Miller. "We noticed that we had a lot of white locks of cotton, and we slowed down the speed of the fan and also the screen in the vertical opener, and in the condenser and by doing that we got a heavier sheet of cotton on the screen and there was less white cotton thrown out in the dust room." One point thrown out by the chairman for consideration in this connection was: "if you are connected direct, and cut that speed just as slow as it will take care of the cotton coming from the vertical opener, you will get better cleaning even with the same beater speed."

Mr. Miller asked for opinions for a reasonable percentage of waste from a vertical opener on low middling, 15/16 to 1 inch staple. H. D. Townsend, overseer carding, Erlanger Cotton Mills, Lexington, N. C., said, "I experimented with that a few weeks ago on this grade of cotton. I tested by running two bales of cotton through the vertical openers and then running it through again. The first time I ran it through I got just a fraction over one per cent, and the second time I got out the same percentage, and I could not tell any difference in the character of it."

In discussing methods of opening, L. E. Anderson, superintendent, Highland Park Mfg. Co., North Charlotte, N. C., said that "the only change we have made has been in the installation of the Murray machine, and we have had very good success with it."

Answering the question as to the amount of waste taken out by vertical openers, Rogers W. Davis reported that on a test made at the Riverside & Dan River Cotton Mills the week previous, with two vertical openers in tandem, and 2,978 pounds of cotton put through, the first vertical opener took out 18 pounds of waste and the second machine removed 17 pounds, with a setting three-quarters closed.

Mr. Townsend, asked concerning the comparative nature of his waste, reported he could tell no difference in character between that taken out the first time the cotton was run through and that secured when the cotton was put through the second time.

Running three vertical openers in tandem, Mr. Chapman said he could tell no difference in the waste taken out in the first, second and third machines. "The waste taken out of the first machine is a good deal heavier, weighs more, but the bulk is the same, about; showing that you get more dirt out at the first and it graduates in weight through the other machines," said Mr. Chapman. He added that on compressed cotton the percentage gotten out by the vertical openers was about 3½ per cent, using grid bars wide open. He had a machine equipped with perforated screen, but got out only ¾ of one per cent.

Mr. Davis added to his report that there was practically no difference in the waste taken out in the two machines in their Danville test; just a little more sand in the first.

The chairman next asked the specific question: How

(*Continued on page* 324.)

Carding Discussion by Fall River Men

The discussion of card room subjects, considering the points of humidity, lubrication, and sizing in the carding department, formed the program of the second meeting conducted for the Fall River operating executives at the Bradford-Durfee Textile School in Fall River, Mass., on Wednesday evening, December 5th. This meeting was in charge of the committee on carding, and T. P. Rooney conducted the discussion as chairman. A report of the discussion follows:

In opening the meeting, Mr. Rooney explained its purpose, saying, "Last year at the final meeting of the season, it was planned to hold this winter a series of overseers' meetings, some to be sectional in character, others to be general. This is the first of the card room overseers' meetings to be held and the object of this meeting is to hold a discussion on certain subjects of interest in the card room. I hope that the spirit of this meeting will show itself here tonight in the debate from the floor. The more we can get together and discuss troubles we have had or experiences we have met with, the more benefit will be received.

"We have been a little disappointed in that two of the men on the committee for this meeting are not able to be here, one through sickness, the other being called away. Mr. Guthrie, however, will give us an outline of what he has picked up on humidity, which as we all know is a very important subject to card room men, Mr. Leach will speak on oiling and the benefits derived from the proper use of lubricants, then I will talk to you men on what I have run across in my travels about sizing. You will understand, I hope, that these are not absolute fundamental principles you must adhere to, but are some of the things we have run across and if anybody has something better than what we suggest, let us hear from them."

Mr. Guthrie was then introduced, and said, in part, "When Mr. Rooney asked me if I would speak to a gathering of card room overseers at the Textile School and tell them of what I have learned concerning humidity and some of the tests I have made, I told him I could not. I could not, I thought, bring myself about to speak to men who, perhaps, had spent a great many years of their life in the textile business and knew it much better than I, but he finally convinced me that you would be interested in what I have learned of humidity so I consented to take the chance. If you bear with me I will tell you something about my experience:

"I have some charts here that show the experiments I have made recently in one of the mills of this city. If any of you men should be interested in seeing these, they are at your disposal.

"When I first went into the mill business I would hear a group of older men speaking of relative humidity, uniformity in humidity, and a good many more 'high faluting' remarks which I could not grasp and which I felt at that time I should never know. Yet the fundamentals are really not at all difficult to grasp. Now, when a cubic foot of air holds as much water as it can without having water deposit as mist, dew or rain, then you have 100 per cent relative humidity, then if you have a cubic foot with one-half as much water in it as it would have to deposit water in some form or other you would have 50 per cent relative humidity, one-quarter as much water means 25 per cent relative humidity. That is what relative humidity means. You take temperature at 33 degrees Fahrenheit and a cubic foot of air can contain two grains of water then you have 100 per cent R.H. (relative humidity). Suppose you take that air at 33 degrees and raise it to 70 without putting in more water, you would then have a humidity dryer than the Sahara desert.

"Some men think that if the humidity is right in the morning, it will be right throughout the day. As a matter of fact, as the temperature of the room varies, the actual amount of moisture in there is going to affect the humidity in different ways. What is the reason we have dew deposit on the ground at night? Well, along in the afternoon the air has taken moisture from rivers, etc., with a fairly higher proportioned temperature than at night. Then the temperature begins to go down and the relative humidity becomes very much higher. The amount of moisture will be uniform all the time but the mere fact that the temperature is varying makes the humidity higher. It took me a long time before I understood what the dew deposit of the air was.

"I would like to say a few words in connection with the hygrometer," continued Mr. Guthrie. "These hygrometers you have in the mill stuck up in a little box, perhaps in a corner of the room, have a dry bulb and a wet bulb. If you take the humidity of the room you read both the wet bulb and the dry bulb and the dry bulb would register also the temperature of the room. Now on the wick the capillary attraction draws the water from the cup onto the surface of that wick and the water will evaporate and the evaporation of the water will send off heat and thus lowers the temperature of the wet bulb. If you had 100 per cent relative humidity your wet bulb and dry bulb would register the same, but just as soon as you do not have 100 per cent there will be a difference in the two readings and the difference comes from the fact that there is evaporation on the wick that covers the bottom of your wet bulb. Take the readings of the two bulbs and calculate with the hygrometer tables and find out what your relative humidity is. In my opinion a hygrometer is the most unreliable device there is for calculating humidity, the strange part also is that they always show readings in favor of the companies that make them. They are ten to fifteen degrees higher than they should be. A carder taking the relative humidity of his room with this instrument would perhaps find it 55 when as a matter of fact the correct relative humidity is between 40 and 45 degrees.

"In my opinion the sling psychrometers are the only accurate instruments for obtaining relative humidity. There is just a wet and dry bulb. You take this little vessel at the bottom and you whirl it around you for about 30 seconds, keeping it as far away from your body as you can so the heat from your body will not affect it, and you will get an accurate reading. Always take your reading as quickly as you can for you do not want to lose any time as that reading will change very quickly."

"Now will some one of you men tell me what he thinks the relative humidity in this room is?" suggested Mr. Guthrie.

"About twenty-five," somebody said.

"That would be about as dry as the Sahara desert," answered Mr. Guthrie. "Somebody else say what they believe the humidity to be."

"Sixty-two," said another man.

"The relative humidity is just fifty-five," continued Mr. Guthrie. "When I take these readings in the mills I would take two or three readings and check them up. It takes a little while before that wick on the wet bulb gets thoroughly wet. I think a fair average is two out of five readings. In my opinion the sling psychrometer is the only correct instrument for calculating humidity. The calculating device for relative humidity is right here (showing a scale for calculating relative humidity from psychrometric readings) and it works like a slip stick. There is also a device for calculating regain; whereas I do not believe this as accurate as that of the relative humidity still it is fairly accurate.

"Now different seasons of the year affect the humidity of your rooms. In the summer time when it is necessary to keep the windows open, air will be circulating throughout your rooms, coming in and going out, this will have a tendency to dry your cotton and you will not be able to get uniformity in humidity.

"I have some charts here you might be interested in. In the mill where I work, part of it has automatic regulation of the humidifying system and part has not. These charts show the difference in the results obtained from automatic and non-automatic regulation. I have brought the most charts from the spinning room as I have the most trouble in the spinning room but of course it is necessary to have humidity in the carding room. Also, you do not want the boss spinner to have the advantage over you who are in the card room and probably show less invisible waste than you as boss carders can show."

Mr. Guthrie here read this report for September 25: "Relative humidity in the morning was 62, at ten o'clock registered 60, eleven o'clock 49, kept 49 throughout the noon hour, one o'clock 55 and then went down to 48, remained at this figure throughout the day. This was taken in a room without automatic control."

"Another test I started on October 15 (you notice I kept away from hot weather. Why, I remember in the summer time the relative humidity went down to 27 or 25 and even down to 20. This last figure taken one day in August, you remember during those two hot weeks we had).

"October 15, seven o'clock down to 43, at nine o'clock it jumped up to 62, twelve o'clock noon went down to 38 and then from this time on until four o'clock about 45, six o'clock 38."

"What was the condition of the outside weather on that day?" someone asked. "I am unable to tell you," replied Mr. Guthrie. "I was running a test for Mr. Cottrell, of the Parks-Cramer Company, on that day and I had so little time I was unable to take it.

"Another thing that might interest some of you men: We were speaking a short while ago about temperatures. Now if you can hold your temperature uniform you would not have much trouble keeping relative humidity uniform."

"Do you advocate humidifying apparatus in the picker room?" was the next question.

Mr. Guthrie recalled that Mr. McDowell, who was the speaker here at the last overseers' meeting, advocated humidification in the picker room. However, he said, "I spoke to Mr. Cottrell regarding the matter and he told me that he would not advocate it but that they of course put humidifiers into picker rooms for concerns desiring them to do so. Mr. Cottrell also spoke to me about higher humidity around cards; he figures that you are getting a lot of static up to 40 per cent but just as soon as you have 40 per cent you are getting away from it. Mr. Cottrell also states that too much humidity about speeders will make itself felt in subsequent processes.

"If you send good roving into your spinning room it will spin a much better yarn. I wish you could see the differences in roving as examined under the microscope. If you do not have enough humidity about your speeders the yarn spun will have a tendency to be very fuzzy and contain many short ends. It is a pretty difficult task to work with yarn of this nature. The value of combed yarn lies in the fact that the combing process has taken out all your short fibers, combed yarn fibers seem to be twisted right in so that you get full value of every fiber in there. It will give you much better break.

"I have made tests on the very same counts of yarn, from the same bales of cotton and in the same rooms, under varying conditions of humidity and here are some of the results I obtained. With 20s yarn under 40 per cent relative humidity the yarn broke at 82.4. With an increase of 41 per cent in humidity there was a difference in the break of 19.1 pounds.

"You can depend upon it that if you get yarns that are not fuzzy and do not contain many short ends you will get better strength on every fiber twisted into your strand."

The next subject, lubrication, was discussed by Mr. Leach, who said, "I have listened with great interest to the remarks of Mr. Guthrie upon humidity and the importance it bears to the different processes in the mill. Just as humidity is important, in like manner is oiling of importance to the different machines of the mill. One should try out the different brands of oil and determine upon a certain oil that he finds gives the best results, after this determination is made he should stand by that particular oil. Oiling at regular intervals is another matter of importance. Certain periods of time should be designated for oiling certain machinery.

"I have experimented a little bit on oils and I find that the best oil for my use is a non-fluid oil. It has proven so satisfactory that I cut down oiling on my speeders two-thirds and my oiling was taken care of correctly. That is my experience with a non-fluid oil. Apply this saving to a mill in both the oil itself, also labor, and I warrant it will run into quite a big item. Machinery must be in line; you cannot have machinery out of line and cut down on oil. If you do, you certainly will run into trouble. I would not advise anybody to do this if their machinery is not in good shape."

Taking up the question of sizings next, Chairman Rooney said, "I believe that sizings are fundamental principles of our welfare. We overseers realize this when things go wrong with the yarns and the beams and the rovings. My experience has been that you must start in the first process, that of opening cotton, to watch out for your sizing results. Unless you get cotton opened fully, I mean by that into fibers, not into collective form but into individual

form, then you cannot get good uniform size on your roving or yarn that is worth looking at.

"You might ask, how do you open your cotton to get that condition? I will tell you what I have worked out and show you as far as possible the results I obtained. At one of the mills I was in there was a Dobson opener and bale breaker. It had a gravity back (I named it myself) which was an iron box that ran from the hopper to an upright apron that had bars I should say perhaps 2½ inches in diameter; from these bars were heavy spikes protruding about two inches. They threw the cotton into the hopper and as it pressed next to the spiked apron each spike took its turn and carried it over the top and it was blown to the next floor below through pipes. Six pipes were fed by means of a No. 7 fan, and this is the basis of our good opening. As the cotton went into the picker, it was in fiber form (you could run your arm into that cotton clear to your shoulder). To be sure, we had trouble but we overcame it and we found that our feed rolls that are directly in front of the beaters on our pickers stopped their jumping up and down. Now, previous to that we had trouble with heavy and light yarn, thick and thin places, and where this feed roll would elevate there was a bunch and under that bunch was a thick place which was taken in by the beater; you might say that the draft evened it but it certainly did not, that bunch was always a bunch.

"We now found that these feed rolls set perfectly still. Whereas we changed our gears every day previous to that, we now stopped changing gears. Together with that, we figured our standard gears for the hank roving we were making and left them and they were there 2½ years and still are, I presume. We had no more trouble with our sizing, but in the same mill we had an automatically regulated humidity system, and the two together I think were the basis of that good sizing we used to get.

"I found that my picker lap varied anywhere from five to sixteen per cent in the length of the lap as compared to the gear figuring. In order to eliminate that I took some leather from an old shoe off the Kirschner pulley and put it on the friction pulleys. I grooved the leather 1½ inches in grooves ⅜ inch wide and 1¼ inch space and diagonally across the leather. It allowed my friction belt to slip in constant revolutions until the lap was finished. I did not entirely eliminate stretch in the lap. The lap rod is held by two claws on the ends and if the friction pulley is held too tightly it will move only two or three inches at a time. The longer it is held the greater stretch in the length of your lap; if you can avoid that you will avoid a lot of trouble in sizing.

"I have changed my hopper feed gear on the upright apron and geared it to large sprocket on the side of the hopper and from that fastened to the same sprocket another small one geared to the bottom apron that slowed down my bottom apron so that it just barely creeps—I am speaking of a Kitson machine. It carries cotton in the hopper at a slight speed and the spiked apron instead of going out half lapped is nearly full lapped. If fed directly into the feed roll it will nearly eliminate those bunches that go through the feed roll.

"Now I am an exponent of long drafts for cards. I have run as high as 158-inch draft. Another man would take exceptions to that rule. If your lickers-in are in shape, polished and sharp, the results are it makes fluffy sliver on the front of your card and it is clean. On sliver lapper, ribbon lapper and draw frames I believe in setting up the rolls to 2¼ inches regardless of what the sliver and staple is. If you do not get away from bulk you will find bunches in your sliver. I have seen a four-head ribbon lap machine that will give you a sheet of cotton equal to a sheet of paper. I have actually seen this.

"On combers, the stretch from between the lap roll and feed roll, especially on the new type Whitin comber, should be watched. If the rolls are not driven at the proper speed it creates uneven sizing, so much so you cannot have even percentage.

"The next process of course is the draw frames. The same settings apply as in the sliver or ribbon lap machines. If you are running a bulky sliver, get away from it. You are not getting sliver that is right. I believe that the two front rolls of any machine that is doing drawing work should be set as near to staple as possible but rolls that do not amount to anything regarding setting for drawing, amount to a whole lot regarding bulk. Get away from this and open up the cotton so that with two rolls you would still get even work; otherwise you cannot. Slow speed draw frames are very essential in good sizing."

Discussing the trumpets on draw frames, Mr. Rooney continued, "We find sixty-grain slivers drawn through trumpets equal in size to the head of a pin. If you have trumpets with straight holes 1 inch long and the distance from the bottom of the trumpet to the center of your calender rolls is 1¼ inch, you are drawing sliver through this small hole and it is possible that the sliver is breaking between the calender rolls and trumpet even if the hole in the trumpet is 1⁄32 of an inch. This will cause thick and thin yarns in sizing. I arrange my trumpets by reaming them so there is no friction on the trumpet. Condensing should be done with calender rolls and not with trumpet. I have run 40-grain slivers through a trumpet that hardly touched.

"On roving frames I believe that if you get the correct sliver and the correct opening you can run from year to year without changing the rack gears. There are times when I have put rack gears on my machines and left them there for a year without touching them. This, I think, is another of the fundamental principles of good sizing together with the right hank roving for the right yarn. I mean by that that the draft must be determined from experiments to find which draw is the best and which gives you the most even yarn from the hank roving. You may be running something today that if you would change a hank higher you would get a better yarn."

Mr. Rooney then invited discussion, and the first question was: "On sliver from a draw frame sizing, for instance, sixty to seventy grains, what would you consider a good variation for your sliver to average?"

Mr. Rooney, answering from his own experience, said, "a grain both ways. At present we are not running sixty to seventy but under those conditions a grain is the normal variation," he continued. "Where we ran on 70-grain sliver in the mill I was speaking of, our variation was greater than that, eight to nine most of the time. After we had made those changes our sizing came back to one grain and stayed there. I believe, as I stated to you before, that the fundamental principle of good sizing is in the opening of the cotton."

"Do you think you should keep down to 1,000 on your beaters on a lap of 11½ ounces?" was next asked.

"Yes," said Mr. Rooney. "You could run at 1,000; if you could arrange your opening system so as to eliminate bunches, 1,050 on your finisher would be ideal on a 11½-ounce lap, but with bunches I do not think you would get the results you are looking for with that speed."

The next man asked if Mr. Rooney thought that the majority of the unevenness in a lap is caused from bunches?

"Unless your cone belts are running within a small radius at all times you are not getting an even lap," was the answer.

"What is your opinion of cork rolls if you have used them in any of your frames?" was asked.

"I have found them indeed satisfactory," said Mr. Rooney. "In fact, I have had trouble with but six of them and these were sent back and replaced with new ones and since that time I have not had a bit of trouble."

"Mr. Rooney, I have listened to your talk with a great deal of interest," said one of the men in the audience. "I wonder if I, perhaps the oldest man here present this evening and at my first attendance at these meetings, may presume to ask you a question. I find the sentiment of this meeting a great deal different than that of those we used to hold, everyone at that time hesitated to ask questions. Now what I want to ask you about is what you have said concerning drafts. Tell me with what length of staple did you run a draft of 158 on your card?"

"1⅛, 1¼, 1⅛ and 1⅛," answered Mr. Rooney.

"Have you ever run 1-inch cotton at that speed?"

"No, I haven't," replied the chairman.

"If you did, what draft would you advocate?"

"158 draft on all kinds," declared Mr. Rooney.

"If you had 158 draft on your card would you run your licker-in at the same speed for your 1-inch as for the 1⅝-inch; and when you get to the roving what would be the results?"

"I have seen nothing that would make me believe anything different," replied Mr. Rooney.

"If I understand you rightly, your licker ran 450 turns a minute with a draft of 150 on the card and that did not have any effect on the fine roving," asked a man.

"None that I saw," said Mr. Rooney. "I know of some mills that have run as high as 200 draft and they are running it successfully so far."

"Is it not necessary to increase the weight on your feed roll?" he was asked.

"No," was the reply, "that is not necessary. In the mill running their cards with a 200 draft I have seen their laps as they come out of their pickers and they are as clean then as my sliver is after it leaves my cards. They have a cleaning process that cleans their work practically in the picker room."

"Does it make the yarn stronger by having that long draft?" was the next question.

"My yarns are breaking on average weights now," said the chairman. "We have spun from 100s to 28s."

"Might I ask what trouble you have run into with cork rolls?" asked one man.

Mr. Rooney answered, "I put in a set of cork rolls on draw frames over one year ago and outside of the six I spoke to you about I have had no trouble. I have them also on slubbers and there isn't a mark on them; there are also no grooves and they still retain their elasticity."

A member of the audience related this experience: "In the mill where I work we have both the leather and cork rolls. The cork rolls we have had in for the past year, the leather rolls I do not know how long. We have the cork rolls on speeders, drawing and roving frames and of the whole set, there has just been one that has given us trouble whereas we have had quite a bit of trouble with the leather rolls. I believe the extra expense in the purchase of these cork rolls is justified."

"Do you think it best to varnish leather rolls on speeders?" a man wanted to know. Mr. Rooney replied, "I believe it best to varnish all leather rolls and my reason is this: By varnishing rolls you have less clearer waste. The clearer waste is composed of short fibers of cotton which get into the yarn from the clearer stick, and varnishing helps to eliminate this trouble. Of course each man has his own special brand of varnish but just as with oils I believe that after you have experimented and found a varnish best adapted to your needs you should stick to it."

The discussion was brought to an end here, and after a few brief closing remarks from E. E. Bohner, of the Associated Industries of Massachusetts, under whose auspices the meetings are held, and H. W. Nichols, principal, Bradford-Durfee Textile School, the session was adjourned. The next meeting, held December 12, at which subjects of the weave room were discussed, will be reported in the February number of COTTON.

A Flyer Balancing Machine.

For keeping flyers in proper balance, in order to reduce wear and to maintain smooth running of roving frames, the Saco-Lowell Shops have developed a new flyer balancing machine. The balancing spindle is driven by an electric motor through a belt with stepped pulleys, giving three speed changes. The lighting circuit will supply necessary power for the motor. The spindle is stopped and started by a foot operated friction clutch. Interchangeable spindle tips are provided to fit the various sizes of flyers in the mill, as well as gauges for the spread of the flyer arms. An adjustable fixture mounted on the table permits the easy removal of worm keys and fitting of new ones.

With flyers being constantly thrown out of true balance from various causes, a machine for maintaining this balance, together with a regular system of examination of flyers should improve the running and consequently increase the life of the equipment, it is pointed out by the manufacturers.

Hampton Smith, southern manager, Steel Heddle Manufacturing Company, with office in Greenville, announces the establishment in Greenville of a service department to cover the southern territory, in connection with the branch plant there. H. H. Wood, for a number of years with the Watts Mill at Laurens and more recently connected with the Dunean Mills, Greenville, has been placed in charge of this department, with S. A. Decker added to the sales force. Mr. Wood is thoroughly experienced in fancy silk and cotton goods and leno fabrics, it is stated, and this particularly equips him for the new position.

A British Effort to Secure Raw Cotton

An Example of Some of the Activities that are Being Carried on Through the British Cotton Growers Association to Increase the Supply of the Staple.

BY ERNEST L. TUTT.

England is much concerned over a supply of raw cotton to keep her great cotton manufacturing industry going. As is usual among the English people, they began several years ago to look ahead to the time when it would be necessary to obtain their raw cotton somewhere besides from the United States. They have been fostering experiments in many new territories in Africa and Australia. Assistance has also been given, looking toward improved varieties and increased production, in Egypt and India. These activities which have been carried on through the British Cotton Growers' Association have proven that climate and soil are suitable for growing cotton in South Africa, Nigeria, Tangan-Yika, Uganda, Australia and other parts of the empire, but that difficulties such as labor, transportation and other problems kept it from being profitable. It has been the hope, however, to overcome these difficulties by the time it was really necessary to call on these new regions for a supply.

When the boll weevil began taking toll of the American crop to the extent that an immediate adequate world supply of cotton is being threatened, England, despite the foresighted view she had taken, is not ready to immediately supply her own needs. In other words, the boll weevil brought on conditions in 1923 that were not expected for several years and England had hoped to be ready to supply English spindles from other sources when adequate quantities were not forthcoming from America. Now that the world supply of cotton is down to rock-bottom and America seems to be unable to overcome the boll weevil and produce a normal crop, Great Britain is very anxious to bring about increased production in other parts of the world—she is now lending every possible encouragement to Brazil's cotton industry, and she is intensifying efforts within the British colonies. Efforts are now being made to grow cotton in every part of the British Empire except in the British Isles and Canada, but it is the purpose in this article to discuss only the work in India.

India is already the second cotton producing country of the world, being excelled only by the United States. India's production in 1919-1920 was over 5¾ million bales British Cotton Growing Association gives the area in 1922-23 as nearly twenty million acres with an estimated yield of 4,800,000 bales of 400 pounds, which is an average outturn per acre of 97 pounds of lint. The principal cotton growing provinces are Hyderabad with 1,175,000 bales, Central Provinces 1,100,000 bales, Central India 240,000 bales, and the United Provinces 175,000 bales.

India consumes internally more than half her total crop. More than half her yarn production are counts of 20's and upwards. Counts above 22's form about 20 per cent of the total. Cotton which produces yarn of above 22's forms about 20 per cent of the total. Cotton which produces yarn of above 22's is the type that enters into competition with American cotton, therefore we shall now limit our discussion to that quality, of which it is estimated India grows 1,400,000 bales. Of this total about 1,000,000 bales are required for Indian mills, about 200,000 are used in so-called village consumption, which would appear to leave only about 200,000 bales for export and most of that goes to Japan. Japan is India's best customer for cotton, purchasing about one and one-half million bales annually, five-sixths of which is very short staple.

The chief provinces in which the better cottons of one inch to one and one-eighth inch are grown are Punjab, Madras, Bombay Presidency, including Sind and the United Provinces. The principal efforts now being made to increase the production of improved varieties of cotton take the form of experimental demonstration farms which are working with American cottons. These farms are being run as object lessons in their sections and they also supply pure strain seed to cultivators. At Khanewal, in the Bombay Presidency, there is an estate of 7,300 acres being managed by a Professor Roberts, formerly principal of the Agricultural College at Lyallpur. In addition to being managing director Professor Roberts is also a very large shareholder. The land is irrigated by the Lower Bari Doab Canal, the rainfall being under five inches. The farms on this estate are all leased to tenants who cultivate the land and pay the zemindar, or landlord, 50 per cent of the crop for rent of the land, water and other privileges. The farms are blocked out into plots of 25 acres, and each tenant must possess two pair of cattle and have three members of the family to work. Some tenants, possessing large families have two blocks, a few only half a block, but the average holding is one square of 25 acres. The tenant is required to put in 10 acres of wheat, 7 acres of cotton, and the rest in food and fodder crops.

The main estate is divided into four towns or villages, each with its own mosque or shrine. The houses built of wood are well laid out, and there are about 35 miles of improved roads on the estate. All the tenants possess an air of prosperity. Some have horses, which in India are considered a luxury, and many of the women and children have large quantities of silver ornaments. There are more applications for land than plots for them. The estate is being run as an object lesson for the growing of improved types of cotton and the better cultivation of crops generally, and natives outside the estate are copying the methods of cultivation and asking for the improved varieties of cotton seed being grown on the estate. In some cases some of the farm staff have been offered higher wages to work elsewhere. The crops being grown are 2,500 acres of wheat, 1,900 acres of cotton, 700 acres of pulse, called gram, and other food crops. About 1,300 acres of the cotton was American varieties, known in India as type 285F with a staple of 1⅛ inch, 4F with 1-inch staple, and 289F with a staple of 1⅛ to 1 3/16 inch. An Indian variety known as Desi is also being grown; it has about ½-inch staple and sells for about 10d when the American cotton brings 16d. Judging from price alone it would seem the American varieties

would be the cotton to grow but the Desi is a strong competitor with the improved types in spite of price. The Desi plant is more hardy and gives a yield of about 16 maunds (82 pounds) of seed cotton to the acre, against 12 maunds of the 4F and 10 maunds of the other two American varieties. It also gives a larger outturn of lint when ginned, the percentage being 35 and 40 per cent for Desi compared with 30 to 33 per cent in the American.

In the Surat district there is another experimental farm of 88 acres where good types of cotton are being produced and the seeds distributed in the district. This cotton, although the name is not given, is of good appearance and has a staple of one inch. The Surat district is in an area where cotton is grown by natural rainfall and the production does not exceed 130 pounds of lint per acre. The yield of 130 pounds is obtained in spite of the fact that there is a pest which does much damage by attacking the bloom.

At Lyallpur Agricultural College there is another experimental farm of about 800 acres in cotton where the American types, 285F, 4F, Desi, and other varieties are being grown. In the Punjab Province about 350,000 acres were planted to 285F and 4F last season and it is estimated that the area may reach 500,000 acres this season. The Agricultural College at Lyallpur has grown up only within recent years. This region used to be a sandy desert but today the canals have changed it into a village with long avenues lined with massive trees and the whole country is well cultivated and prosperous in appearance. The college buildings, laboratories, etc., are modern and 170 students annually obtain first-class agricultural training for about £36 a year.

Central Provinces and Berar.

In the Central Provinces and Berar "Upland Georgian" an American cotton was introduced in the sixties but has now deteriorated in quality so that the fiber is weak and the staple only about ⅞ of an inch in length, according to a letter recently received from D. Cloustan, a member of the Indian Central Cotton Committee. Mr. Clouston says experiments with American cotton have been carried out in the Central Provinces and Berar over a period of 16 years. Mr. Clouston has classified the native types, grown in these provinces under the names of Jari and Bani, Jari being a mixture of six different kinds. When grown pure alongside of the other fine cottons referred to as being classed under the name of Jari, Upland Georgian was found to give a relatively poor yield of lint per acre. Buri, another Upland American type, is therefore being substituted for the Upland Georgian. Buri does well in years of good rainfall, but the average yield over a period of years falls well below that of Roseum, the most prolific of the indigenous Jari types. From research, however, it has been found that Buri is quite immune to cotton wilt, which is slowly but gradually spreading over part of the cotton tract as a result of the tendency to crop the same land with cotton year after year. Cotton growers have, therefore, been advised to plant Buri in the fields infested with the wilt fungoid. Many of them, however, deliberately sow a mixture of Buri and Roseum seed in their infested fields, because they argue that in years in which wilt does little harm Roseum gives a good yield, while in years when the disease is rampant the Buri all survives.

The area under pure Buri was much larger several years ago than it is today, Mr. Clouston says, but the growers became disheartened when the local mills which had promised a premium of 25 per cent over that of Jari, gave little or no premium in years when the Buri fiber was weak. The strength of the fiber of this and other exotic cottons suffers in dry years with the result that the grower gets a smaller yield than he gets from the best indigenous kinds and also a weaker fiber. When he does not get a premium to compensate him for the loss in outturn he therefore gets a reduced acreage profit and becomes discouraged with the improved varieties.

If a premium of 25 per cent could be guaranteed for the Buri, Mr. Clouston says he could get a large area planted in this variety within three years. There are in the Central Provinces 571 cotton seed farms run by private landowners and a dozen government farms from which fresh seed is supplied to cultivators every year. Enough seed could be distributed from these seed farms to plant 30,000 acres annually. About a million acres of Roseum cotton is being sown each year with seed propagated and distributed in this way.

Combodia cotton, which closely resembles Buri, has also been tested in the Central Provinces but in years of drought it suffers more than Buri from red leaf blight, as it is slightly later in maturing. Since the ordinary cultivator cannot afford to stake his all on a variety which does moderately well in good years only, it is doubtful that Cambodia will ever become popular, unless the premium paid for the lint suffices to compensate for the relatively low yield obtained in dry years. The Indian farmer is not a wealthy man and cannot afford to take risks in a province where there are no irrigation facilities. Other types of American cotton now being produced in the Punjab and United Provinces have been tested in the Central Provinces but have not done well. A variety known as Sindewahi cross, which is a cross between Bani and Roseum, is now being propagated by the Department of Agriculture and promises a probable future source of better cotton. It compares favorably with American upland.

Sind.

At the present time the area under cotton in Sind is about 300,000 acres. Under the new irrigation project, known as the Sukkur Barrage Project, which was begun in 1920 it is hoped to increase the cotton lands about three fold. The entire new canal system will command about 5½ million acres. These canals fall into three main systems known as (1) the Left Bank System, (2) the Right Bank System, (3) the Eastern Nara System. Of the total area in the whole system 745,000 acres is allotted to cotton, 568,000 to millet and the remainder is to be in rice. It is said that cotton cannot be grown on rice land but can displace millet when economic circumstances are favorable, such as high price for cotton and cheap foodstuff—available from other sources. It will then be seen that when these canal systems are in full working, the cotton area of Sind will amount to three-fourths of a million acres, and that it may be pushed up to over one and a quarter million acres. It is estimated, however, that it will require 30 years to bring the project into full development.

T. F. Main, deputy director of Agriculture of Sind, says the projected barrage at Sukkur is the key to the successful cultivation of staple cotton in Sind. If only the canals, without the barrage were constructed the cotton position would not be assured. It has been proven that it

is necessary to have water in April-May because staple cotton must be planted during that period or earlier. On the other hand, it has been learned from experience with the Jamrao Canal that reliance for early water cannot be left alone to the natural rise of the river caused by the flood supply, because the flood varies both as regards degree and date. Past experience on the Jamrao Canal has also shown that the popularity of American cotton has varied with the amount of water entering the canal during the months of April and May, a factor which at present is not under control because of the absence of a barrage. Repeatedly excellent Egyptian and American varieties have been produced in this district but these have been dropped in favor of a low grade, quick maturing, hardy variety which will tolerate the present conditions. Given an assured supply of water, as regards time and quantity it would be possible to produce high grade cotton on a substantial scale.

Punjab.

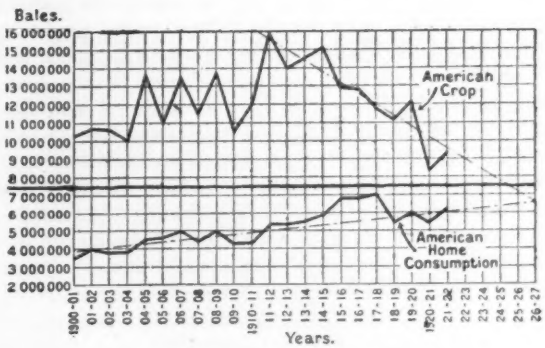
In 1921 the comparatively better returns from the Desis; the difficulty of obtaining good American seed from the 1921 crop; and the belief that the American cotton had greatly deteriorated caused a great decrease in the area planted to American in 1922. The 1922 crop of American, however, has produced a larger yield than Desis grown alongside of it, and the price was much higher, says D. Milne, Government Botanist, of Punjab.

On one estate of 250 acres, 125 acres were planted in 4F and 125 acres in Desi. The average yield of the American 4F was 7 maunds per acre while the yield of Desi was only 5½ maunds per acre. The American sold for Rs. 18 per maund and the Desi only brought Rs. 12-8-0 per maund. In value the American yielded Rs. 126 per acre and the Desi only Rs. 60-12-0 per acre. This resulted in the demand for American seed for the 1923 crop again being very keen.

An interesting point is that despite the fact that the Department of Agriculture insists on getting the consignments ginned without mixture, and the seeds returned to the Department for planting purposes, ginners are mixing the pure lots with Desi during the ginning process. Complaints have come to hand that mixtures of 50 per cent or over are taking place. It is evident, therefore, that efforts to help farmers by giving them improved cotton are being practically stultified by the extensive mixing and adulteration that is going on. It is also possible to increase the yield per acre in the Punjab by proper methods of cultivation. In fact, Mr. Milne says he is convinced from his investigations and experiences covering the past 15 years, that with the types of cotton they have now developed, cotton of just as good quality and staple as American Upland can be grown in the Punjab Province any year if it gets sufficient irrigation and reasonable cultivation.

Madras Presidency.

The prospects of a considerable increase in the near future in the production of Cambodia and other good staple American cottons in the Madras Presidency are not great, according to a letter written by G. R. Hilson, cotton specialist of the Agricultural College of Coimbatore. Increase in the area planted in Cambodia, especially in those sections where it is not now extensively grown, is to be expected, but the magnitude of the increase will depend very largely on the activities of the Department of Agriculture, which unfortunately just now is tending to slow down owing to financial difficulties. There appears to be a possibility that cotton of good staple can be grown successfully on the lower elevation of the Nilgiri and other hills in Madras. A few months ago a consignment of 806 pounds of seed cotton of the Webber 49 variety was received at Coimbatore from a planter on an estate in the Nilgiris. This cotton was reputed to be the produce of one acre and to have been grown at an elevation of 3,000 feet. It turned out 266 pounds of lint when ginned and the grade and quality was better than Cambodia. When tested in a local mill along with Uganda cotton which was being spun to 30's and 40's it was shown to be only slightly inferior to the Uganda variety.



An interesting sidelight on the English state of mind concerning the cotton situation may be gleaned from the accompanying chart which appeared in the London Daily Times' Trade and Engineering Supplement.

In commenting on this chart they point out that it is intended to show the relation between the American cotton crop and the consumption of American cotton mills during the present century. The dotted lines, which indicate the trend of the two sets of figures show clearly the steady decrease in the gap between them which represents the exportable surplus of American cotton. They set these facts forth as a further indication of the urgency of rapid expansion of cotton growing within the Empire.

The area suitable for growing long staple cotton could be considerably increased if a number of proposals for minor irrigation works could be carried out. Mr. Hilson believes that if the idea that canal irrigation means rice cultivation could be discarded, and if a logical system of charging for water according to the quantity required for the crop could be introduced, some of the irrigation schemes could be perfected. An increase in the yield per acre by the distribution of seed of better strain and by the introduction of improved methods of fertilizing and cultivation will in the main depend on the work of the Agricultural College, and the attention of the college, which has been established only three years, has so far been confined only to the work of isolating pure strains of seeds.

It is to be seen from the foregoing, therefore, that the road to a large supply of cotton of the quality of American is one filled with many obstacles. It may be possible to increase the present production of less than 1½ million bales of this variety to twice that amount within several decades but there is really no assurance that it ever will be done. W. H. Himbury, general manager of the British Cotton Growing Association, in a bulletin recently written on the

Indian cotton industry, says that to sum up the position generally, India being already a large cotton producing country, the real question to be decided is, primarily, can cotton of a type equal to American be grown in large quantities economically, and if so what parts are the most suitable for its cultivation? This question cannot be dealt with straight off, evidence for and against having to be carefully weighed. The real trouble in India is that there is a short growing season which is largely against those types which are of longer growth in maturing. When Indian cotton is being produced nine months out of twelve in India there is always some trouble: as, for example, in rain-grown areas the rains are not well distributed, in others after a few months serious insect pests appear, and in the irrigated areas north there are frosts, so that generally the season is a short one, and this is the main reason Desi and other Indian cottons of a short staple are more certain and more popular with the cultivator. In view of this fact one has to choose the district likely to prove the most favorable, and naturally one turns one's attention to the irrigated areas of the Punjab and Sind, the only real trouble being the advent of frost, but by very careful selection and breeding the Agricultural Departments have evolved a type or types which may be considered quite satisfactory for a start. The first is known as 4F, and the others 285F and 289F. The last two arrived after the 4F, and are an improvement.

Having decided upon the type there are still a few other difficulties to be got over. There is a competitor in Desi, which gives a large yield per acre, from 25 per cent to 30 per cent more, and a higher ginning percentage plus a shorter growing period, which even in the Punjab is important because the farmers instead of using the last watering for their cotton can use it for sowing the early winter wheat, and this is not possible with the American type. Everything, however, is not always in favor of Desi, because should this type get a setback in the early stages, the crop is permanently affected, but with American this is not so; owing to its later flowering and fruiting it has been known to give a good second or third picking, while the native early type has failed, so that here you have a point distinctly in favor of American.

Another factor, against the American, is the difficulty the grower has to get any improvement in the price paid for his seed cotton, and yet again very little of the improved cotton actually reaches the spinner unadulterated, so that he is quite unacquainted with the type which can be grown, otherwise he might be inclined to pay a higher price for it.

Again one meets with people, sometimes merchants or spinners, who do not want improved cottons; they use the present short types and are afraid of their supplies. One might find a similar feeling among certain sections of the trade in England if a campaign was started to grow all long-staple cotton of the Egyptian variety, so that this criticism has to be listened to and answered.

Nevertheless, after a very careful survey of the whole question, and judging from what he has seen and heard from reliable authorities, Mr. Himbury believes India can and will produce a good quantity of cotton of 1 1/16 inch to 1⅛ inch, and that the most suitable areas will be the Punjab and Sind. Of course the Central Provinces and Madras Presidency will do a good deal, but the Punjab is larger and more certain. Here is already found ten million acres of land under canal irrigation, one of the largest areas in the world, and this is being added to immediately, the work being in progress, so that shortly a further million acres will be available for cotton, wheat, etc. Irrigation in the Punjab is giving the Government a good profit in spite of a low water rate, which could stand, if necessary, an increase. In addition there is an area in Sind which if provided with water by barrage would give a further half million acres of cotton land suitable for growing the best type of American. What is required in India to produce a large and increasing supply of the better staple is (1) Continued experiments by experts to produce still more prolific and earlier maturing cotton. (2) The seed of the present types to be kept pure until such time as something better can take its place. (3) The grower should receive a price more in accord with the real value of his product. (4) Something must be done to prevent the mixing of the American seed cotton with the Desi at the ginnery, or while in the merchants' hands. Mixing is openly done; no secret is made of it, but the effect is harmful in the extreme. Finally, the above problems, while difficult, are not incapable of solution, and Mr. Himbury expresses himself as being optimistic enough to say that if the business is properly tackled in five years India should produce six million bales of cotton, two million of which should have a staple of 1 1/16 inch, against the present production of five million bales, not quite half a million of which come under the higher class.

This statement, although made by an Englishman, the general manager of the British Cotton Growing Association, after having just made a special study of the possibilities for improved cotton culture in India, is none too optimistic. If the Indian production as a whole can not be raised more than one million bales, and if the production of staple cotton can not be increased more than a half million, England can not expect much aid in her present difficulties in obtaining a cotton supply from that quarter. If India is able to increase the production of staple cotton a half million, the probabilities are very great that at the same time the demand for this better grade of cotton will have increased in her home mills to the extent that the increased supply will all be consumed at home.

What will England do? She will probably put forth greater effort in other parts of the empire.

Southern Railway System has recently issued a well prepared and interesting booklet on the subject of "Apples." The purpose of the booklet, which contains 32 pages, is to give reliable information and encourage the raising and eating of the best apples; on the one hand, giving reasons from the health standpoint, why apples should be eaten, on the other hand, why certain regions produce apples of high quality at a maximum profit; and why these conditions are also favorable to human health and happiness. The states served by this railway system are dealt with separately, and interesting figures given as to their respective advantages in the production of apples, as well as present production figures. The illustrations show typical orchard scenes in southern states. The latter section is devoted to a number of recipes for preparing and serving apples. Copies may be secured by anyone interested upon application to the Southern Railway System.

What the Southern Mills Are Doing

Progress Forward! seems to be the motto with which the southern mills are entering the new year. Though 1923, from a number of intangible causes, may not have been extraordinary successful from the financial point of view, certainly a review of the construction work projected and completed during the year removes any doubt as to the stability and confidence of the industry.

December contributed its share toward new construction, improvements and enlargements announced. One of the largest in scope and in significance was the statement that the Joseph Bancroft & Sons Co., cotton bleachers of Wilmington, Del., had completed the purchase of 600 acres of land at Old Fort, near Asheville, N. C., upon which they will erect a modern village and bleachery.

Almost coincidental with this report, as another indication of the development in finishing in the South, came the announcement of the Sayles Finishing Plants, Inc., of Saylesville, R. I., that they would erect at once a $2,000,000 bleachery and finishing plant together with the necessary village on the Swannanoa river about four miles from Asheville.

North Carolina seemed to have the preponderance of reports of new construction and improvements during the month. K. S. Tanner, vice-president and treasurer, and S. E. Elmore, secretary, of the Spindale (N. C.) Mills Company, were reported organizing a company to be known as the Chimney Rock Mountain Company, to erect a cotton mill and large hydro-electric plant near Chimney Rock, N. C.

Machinery contracts for the new Balfour Mills, Inc., at Balfour, N. C.—Captain Smyth's new mill—work on which is rapidly going forward, have been let. The machinery will include Saco-Lowell preparatory and spinning equipment, Entwistle warpers, Hopedale looms and Curtis & Marble cloth room equipment. The mill will at first contain 10,000 spindles and 260 looms, but plans provide for future enlargement. The machinery will be electrically driven. Print cloths will be manufactured. J. E. Sirrine & Company, Greenville, S. C., are the engineers. The Fiske-Carter Construction Company of Greenville has been awarded the contract for the erection of 75 four- and six-room houses for the village.

Cascade Mills, Inc., Mooresville, N. C., have awarded contract for heating equipment for their plant, which is now being improved and enlarged, to the Parks-Cramer Co., Charlotte, N. C.

A new weave shed will be erected for the Manville-Jenckes Company, Gastonia, N. C., by the Aberthaw Construction Company. The building, it is understood, will contain approximately 25,000 square feet of floor space and will house about 125 looms.

Hannah Pickett Mills, Rockingham, N. C., have let contract for the construction of Mill No. 2, which will be 250x390 feet, to house 25,000 spindles and 800 looms.

Robert & Company, of Atlanta, have been engaged by Steele's Mills, Rockingham, N. C., to make extensive improvements and additions to their plant. This will include the construction of a one-story addition, 75x100 feet, to the main mill, which will house beaming and slashing equipment. A power plant for heating the mill and process work will be installed, and the electrification of the mill will be completed. Also four new warehouses and new waste working and opener rooms are being built.

Construction work on the addition to the Amazon Cotton Mills, Thomasville, N. C., is progressing. The installation of the equipment is expected to be completed by the last of January.

The A. M. Smyre Mfg. Co., Gastonia, N. C., is installing a vacuum card stripping machine in the No. 2 Mill.

A two-story addition, 56x80 feet, for new picking and carding machinery, is being erected by the Dilling Cotton Mills, Kings Mountain, N. C.

The textile building at the North Carolina State College of Agriculture and Engineering, West Raleigh, N. C., will be extended approximately 75 feet and new equipment installed. J. E. Sirrine & Company, Greenville, S. C., are the engineers.

The Leak Manufacturing Co., Rockingham, N. C., is installing a water-works and sewage system in its mill village. Robert & Co., Inc., Atlanta, Ga., are the engineers.

The new plant of the Oakboro Cotton Mills, Albemarle, N. C., has started operations.

South Carolina, while reporting no new mills, contributed quite a bit in the way of improvements and enlargements.

The Arcadia Mills, Arcadia, S. C., are having a complete sewage and water works system installed in their village in connection with the plant addition now under construction. Lockwood, Greene & Co., engineers, are the designers and supervisors of this work.

American Spinning Company, Greenville, S. C., have engaged J. E. Sirrine & Co., engineers, to prepare plans for a cloth room addition to cost about $15,000.

A cloth room addition will soon be erected by the Langley Cotton Mills, at Langley, S. C. Lockwood, Greene & Co. are the engineers.

Improvements are being made at the Ninety-Six Cotton Mills, Ninety-Six, S. C., and reconstruction of the mill village is under way. The total cost of the improvements will be about $200,000.

Southern Bleachery, Inc., Taylors, S. C., has let contract for electrical power and lighting installations to Huntington & Guerry, Greenville, S. C.

L. P. Hollis, superintendent of the Parker School District, at Greenville, S. C., has plans under way for the securing of a $40,000 building to be used as a textile school as a part of the city school system. This school district embraces the mill villages of Greenville, and Mr. Hollis hopes to be able to effect his purpose in connection with the textile school.

Another feature of interest in this connection is the plan under way for the establishment of a part-time school at Greenville to allow workers in the mills of that city to "work a week and study a week" under the same arrangement that is in force in a number of Georgia and Carolina mills, having two shifts of workers for each operation.

In Georgia, the Fitzgerald Cotton Mills, at Fitzgerald, are adding a number of looms for specialty work, and it is planned to make further enlargements in the future.

The Canton Cotton Mills, at Canton, Ga., have awarded the contract for humidifying apparatus in their new mill to the Parks-Cramer Company.

Lawrenceville Mills, Lawrenceville, Ga., are to construct a $100,000 addition to their manufacturing plant.

The new bleachery to be erected at Thomaston, Ga., by the Thomaston Cotton Mills will process sheetings and similar materials. A pumping station of 2,000,000 gallons daily flow is nearing completion on Potato Creek, about a mile from Thomaston. The cost of the new plant will be approximately $500,000.

The Englewood Mfg. Company, Englewood, Tenn., has completed a two-story addition, 100x40 feet, and have also added a story to the finishing room which is 75x24 feet.

An addition to the packing and shipping department is being made by the Rockford Mfg. Company, Rockford, Tennessee, and further improvements are also planned.

A site of fifteen acres has been selected for the new El Paso Cotton Mill Co., El Paso, Texas. M. H. Merrill & Co., of Boston, are the engineers in charge of construction. The plant will include about 5,000 spindles. The company is capitalized at $500,000. The officers include A. P. Coles, president; H. M. Moore, acting secretary, and T. P. Henderson, manager.

The Houston (Texas) Cotton and Twine Mills have been incorporated with a capital stock of $100,000 by J. W. Pritchard, F. L. Pearson, and John B. Green.

The Jonesboro (Arkansas) Cotton Mills, will construct a plant, and Gus F. Roberts, of Charlotte, N. C., head of the Southern Textile Banding Mill there, and formerly general superintendent of the Avondale Mills at Sylacauga, Ala., will be general manager of the new Jonesboro mill, it is reported.

The California-Pacific Textiles, Inc., Huntington Beach, Cal., will soon start construction on a tire fabric plant, three-story, concrete construction, 80x200 feet, to be equipped with 10,000 spindles. W. A. Golden is president and L. W. Cuddy superintendent.

Itasca Cotton Mfg. Co., Itasca, Texas, have awarded contracts for new machinery for the additional buildings, which consist of 100x120-foot weave shed, and a 60x80-foot picker and card room. The Saco-Lowell Shops will furnish carding and spinning equipment, and the Draper Corporation has the contract for the 72-inch looms.

A combination of important mill properties is contained in the formation of the New England Southern Mills, a corporation to operate the following plants: Pelzer (S. C.) Mfg. Co., Tucapau (S. C.) Mfg. Co., Stark Mills, Hogansville, Ga.; LaGrange (Ga.) Mills; Lisbon Mills, Lisbon, Maine; Lowell Mills, Lowell, Mass.; Cosmos Cotton Co., Ltd., Yarmouth, N. S., and the Imperial Cotton Co., Ltd., Hamilton, Ontario. This combination represents a consolidation of the southern properties acquired by Lockwood, Greene & Co., recently, and the plants of the International Cotton Mills. The combined spindleage is 362,000, and the mills make a wide diversity of product, including print cloths, sheetings and drills, crash toweling, tire fabric, hose and belting duck, combed yarn, and heavy duck. It was first announced that the Lancaster Cotton Mills, of Lancaster, S. C., were sold to the International Cotton Mills by Colonel Leroy W. Springs, but this report was later denied and these mills were not purchased as first stated.

The Opelika Mfg. Co., Opelika, Ala., recently purchased by George H. Lanier and associates, is making many improvements. A dyehouse has been erected and the warehouse facilities enlarged; and several new houses erected for operatives.

Tallassee Mills, Tallassee, Ala., will electrify the No. 1 Mill, and have let the contract for the installation of equipment to Huntington & Guerry, of Greenville, S. C.

A plant for the manufacture of 8s yarn is being erected at the Cowikee Mills, Eufaula, Ala. Contract for the machinery has been let to the Saco-Lowell Shops.

The New England Mill Situation.

High costs of production and a very limited demand for many of the best known standard staple cotton goods are pressing hard on the New England cotton industry. Earnings are decreasing, mills are curtailing production, and many operatives are idle.

The last government cotton crop report estimating a yield of approximately 10,000,000 bales removes the last hope of those who have thought that high cost cotton was largely of speculative origin. To quote one large manufacturer, "The cotton industry is now face to face with real cotton scarcity as a result of losing virtually one crop out of four in the last few years. Whether people buy goods or not in normal volume, many mills will have to curtail their output before a new cotton crop begins to come to market."

In Fall River there are some mills that have not turned a wheel for six weeks. Print cloth mills there are operating less than half their equipment. Some other mills are running about 80 per cent capacity. New Bedford mills are not averaging over 75 per cent full capacity output although some plants are running in full and overtime. They are engaged on specialty products, some of which are silk and cotton materials.

Gingham output has been cut one-half compared with a few years ago and while the Amoskeag Company is restarting its plants it is not turning out more than 60 per cent of its possible production. The Lancaster, Bates, York, Everett, and other large gingham mill are running short time. There is business on the very fine and fancy ginghams but at prices that do not invite mills to add more looms to secure a larger product, nor at prices that make mills care to sell freely a long time ahead. In some instances lines of fancies have been withdrawn from the market as mills have sold all they care to make of fancy designs at a price buyers will pay.

The large print works owned by corporations have been maintaining well up to a full output, buying their cloths in the open market at prices below those at which their own mills can make them profitably. This accounts for notice already given by the Pacific Mills of their purpose to close their cotton mills at Lawrence two weeks at the end of this month.

The large bleachery of the Pacific plant has been running in full and overtime but many other bleacheries throughout New England have been running only a part of their machinery. Large corporations owning their own mills and bleacheries have been working on such close profit margins that the ordinary bleaching converter, who must buy his gray cloths in the market and pay bleaching costs that provide a profit for the bleachery, has been unable

to compete. Meanwhile, the limited demand for the goods can be supplied by the larger works.

The jobbing plants for finishing, either in printed, dyed, or colored effects are not running in full. Some are down where less than half their capacity is engaged. This has been brought about by the unsatisfactory prices received for finished goods and the unwillingness of converters to anticipate future production. Back of the whole situation lies the fact that jobbers and retailers throughout the country have been pursuing a hand-to-mouth buying policy which is naturally lessening the opportunity of the producer to plan work ahead.

There are many manufacturers who are convinced that the country is over-equipped in cotton machinery to meet any demand that is likely to develop with cotton above 25 cents a pound. Should cotton continue on a high level for two seasons in succession or more, it is probable, they think, that consumers would grow accustomed to the higher levels of price. But that is a remote probability at present and for the next eight or nine months it is believed that curtailment will be felt most by those mills that are afflicted with high and not easily changed costs, or are managed by mills that do not care to fritter away reserves in fruitless competition.

The seemingly anomalous condition whereby the South is giving abundant evidence of a great prosperity in new mill building is more disturbing to the investor than to the ordinary New England mill manager. There are some mills in New England that are running in full and making wonderful profits. The Naumkeag mill at Salem, Mass., is running in full on wide sheetings. Some mills in Fall River are running full and showing good profits side by side with others that are idle.

The point now being emphasized by mill stock investors is that management in selecting and selling product has much to do with the result obtained from a mill whether located South or North. The rush of investment South may bring about an exhaustion of skilled operative labor and thus tend to raise or keep wages high, it is argued, or the continued operations of mills in advance of a market that is taking goods freely and on a non-profitable basis for the producer, may soon bring about its own cure before the high cotton season ends. This is but repeating the experience of history in the business and some of the older New England men are looking upon the present strained condition philosophically. One of them summed up the immediate condition by saying that he was reconciled to losing money for one whole year and the real problem he was wrestling with was to determine when running or stopping meant the greatest loss.

It has been found at Fall River that it costs nearly $15,000 a year to keep a 100,000 spindle plant idle, due largely to excessive municipal and other taxation. The loss is made up of taxes, insurance, interest, and salaries that must be paid if even a skeleton organization is to be maintained. But basing the probable earnings at current cloth and cotton prices the same mill would lose even more than that sum by running, especially if instead of shipping the product it was decided to pile it up in a warehouse to await the day of renewed demand.

During the past few weeks there has been much talk in New England about the very large imports of British cotton goods. They come into competition largely with the fine ginghams and the fine shirtings that are made in Rhode Island and New Bedford mills. Late reports show that England is shipping here about 15,000,000 yards a month of fine cotton goods. This is from three to four times the quantity that came in ten years ago. It is twice the volume that was shipped from England a year ago.

These large imports are due in part to the greater push made for American business by agents for English mills and by the willingness of American converters to use English goods to break down the prices asked for the home product. The fine cotton goods markets have been very slow to respond to the advancing prices for staple cotton, rather slower in fact than many finished goods of coarser descriptions have been in the jobbing markets of the country.

Far seeing merchants and manufacturers have not been finding much fault with these imports as it is felt that many English markets have been closed through the impoverishment of foreign peoples by the world war. They also have said that England must pay her debt in some way and if she cannot sell her goods somewhere she will not be able to pay her war debt as she is now doing. On the other hand, some tariff experts have declared that addditional protection should be afforded mills making the finer goods and the home market should be preserved for home mills.

This view was recently expressed at a meeting of manufacturers in Rhode Island and it has been talked of in other places where mill men meet. There has been some talk of invoking the protection of the flexible tariff provisions in the tariff law. Hesitancy to move in that direction arises from the fear that if the tariff question is opened at all it will break loose in Congress and cause still further trouble. Consequently, some men want to "grin and bear it" till cotton itself changes for the better from a manufacturers' viewpoint.

The wash fabrics season for 1924 has been a disappointment in that most of the advance buying has been confined to a few fabrics. Flock dot voiles have sold freely and several New England plants are engaged on them. Crepes of many kinds, plisses, and printed crepes of a standard character have sold better than voiles and some of the other semi-staples. The advance gingham business has been comparatively small. The printed lawns, batistes, dimities, and other staples have been dull. Most of the advance wash goods trade, in fact, has been of a specialty character with the high priced silk and cotton materials leading everything in value.

The napped goods season for 1924 was started by an announcement on the part of the Amoskeag Company of its willingness to take advance orders on wide flannels for the cutting trade at the list prices of a year ago. These prices are much under the parity of present day cotton yet buyers have operated lightly. The cotton blanket season opened with prices advanced from 2½ to 5 per cent. Bleached cottons, wide sheetings, sheets and pillow cases, tickings, and many other lines have been advanced but little new business is being booked at the higher prices. Prices on towels, bedspreads, and other miscellaneous products have been advanced from 10 to 15 per cent above the low prices of the year. The mills that have business in hand

to any great extent are those that booked orders before advances were exacted.

During November cotton was rushed into New England very freely. But mills as a whole are not supplied on an average beyond March. There are some mills that have bought a full supply for the season but they are rare exceptions. Some of the fine yarn mills have so little long staple cotton that they will not take any business above 70s unless they can get prices full up to what they ask based on current cotton cost. Less Egyptian cotton has been bought for the reason that inasmuch as the prices users will pay for the fine long staples are so low, that there is no inducement for the mill to buy.

Cotton Comment.

BY H. AND B. BEER.

New Orleans, December 15, 1923.

The advancing tendency of the market was not checked until the close of November when contract values reached the 37 cent level and middling cotton, New Orleans, sold at 36 cents.

In our review of one month ago we stated: "For the moment, owing to prevailing high prices and the uncertainty of the European political situation, as well as the possibility of the crop being under-estimated, just as it was over-estimated sometime ago, conservative brokers are advising caution pending further developments."

When the market was at its "peak," the introductory of our daily cotton market letter was as follows: "What may prove to be the culmination of the bull movement in cotton for the present was witnessed this morning when values, due to strong cables, established new high price levels for so far this season."

Subsequent developments have proven that our analysis of the situation at that time was correct, as the market has declined about four cents, or about $20 per bale meanwhile, and for the very reasons we mentioned on November 30: The crop, of late, having been under-estimated, and because of the unfavorable European political situation.

That the crop was underestimated of late, is noted by the annual estimate of the government, December 12th, indicating a yield of 10,081,000 bales exclusively of linters vs. recent private estimates for a production of 9,320,000 to 9,500,000 bales.

The government's crop estimate by states was as follows, compared with last year's production: Virginia, 50,000 vs. 26,515; North Carolina, 1,020,000 vs. 851,640; South Carolina, 795,000 vs. 492,535; Georgia, 590,000 vs. 714,998; Florida, 12,000 vs. 25,021; Alabama, 600,000 vs. 823,498; Mississippi, 615,000 vs. 989,273; Louisiana, 365,000 vs. 343,274; Texas, 4,290,000 vs. 3,221,891; Arkansas, 620,000 vs. 1,011,457; Tennessee, 220,000 vs. 390,994; Missouri, 115,000 vs. 149,000; Oklahoma, 620,000 vs. 627,419; California, 49,000 vs. 28,243; Arizona, 83,000 vs. 46,749; all others, 37,000 vs. 19,310; U. S., 10,081,000 vs. 9,761,817.

In our opinion contracts and spot cotton are at value again, but the immediate future course of values will likely depend mainly on whether or not there is a revival in the trade demand, which, since the heavier ginnings than expected to December 1st—9,244,000 bales vs. 9,320,000 to corresponding date last year, and the government's forecast for a yield of 10,081,000 bales, has been conspicuous by its absence.

As yet, however, spinners of the world have taken of the American product less than half of their season's requirements, or 5,129,000 bales against 5,687,000 one year ago, and have yet to buy much of the staple for their future requirements.

To give an idea as to the rapidity with which this year's crop is being marketed, we will cite the fact that to December 14th 7,446,000 bales had come into sight compared with 7,371,000 to corresponding date last year, making it likely for over 8,000,000 bales to be marketed to the close of December.

The world's visible supply of American cotton has about reached its peak for the season, it now standing at 3,155,000 bales vs. 3,595,000 last year, and will probably begin to decrease this week and continue to decrease during the remainder of the season until it will likely shrink eventually to the irreducible minimum, as noted by the following deductions, based on the government's crop estimate and carry-over from last season:

American cotton	This season	Last season
World's carry-over, July 31-23	2,573,000	4,879,000
Indicated crop	10,081,000	9,762,000
Linters, estimated	650,000	610,000
Indicated season's supply	13,304,000	15,251,000
Burnt, etc.	(?)	47,000
Total net supply	13,304,000	15,204,000
World's consumption, est.	12,000,000	12,631,000
World's carry-over, July 31-24, est.	1,304,000	2,573,000

Notes About Men You Know.

HENRY C. WALL has been elected president and treasurer of the Roberdel Mfg. Company, Rockingham, N. C., succeeding the late T. C. Leak.

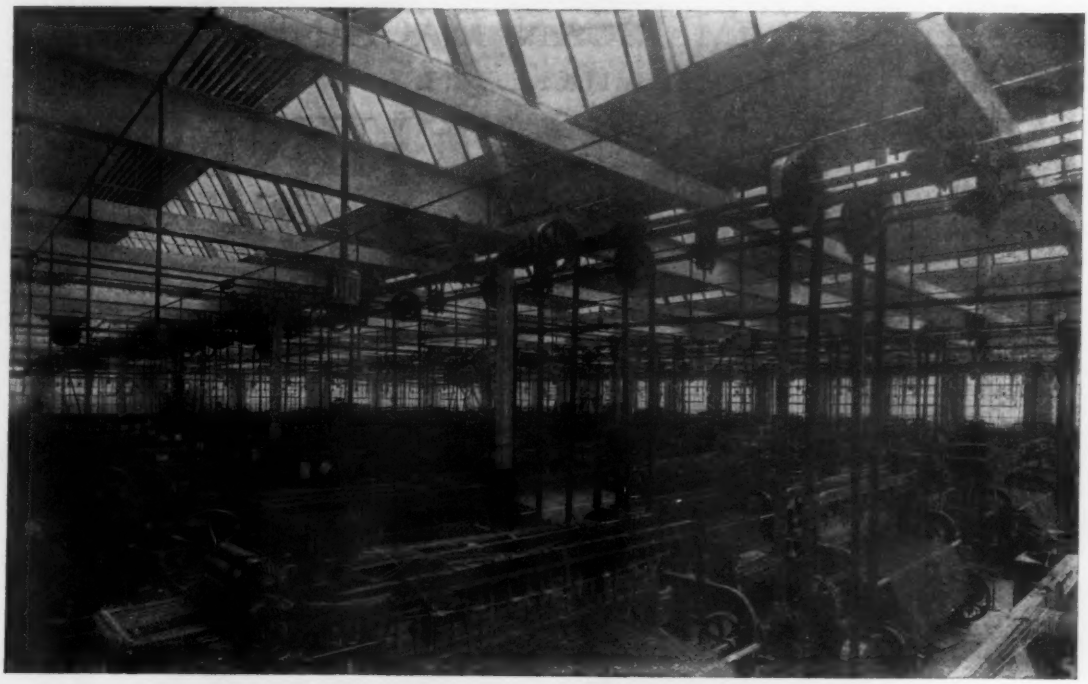
G. J. BENNETT, formerly with the Nyanza Mills, Woonsocket, R. I., has accepted the position of superintendent at the No. 4 Mill, Marlboro Mills, McColl, S. C.

L. G. BUCKLE is representing the Oxweld Acetylene Company, with headquarters in Charlotte, N. C., and H. C. Hall, 38 Luckie St., Atlanta, is the representative in that city.

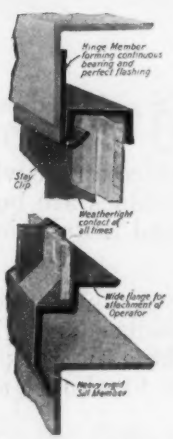
GEORGE W. MURPHY, for the past several years superintendent of The Dixie Cotton Mills, at LaGrange, Ga., on January 1st became connected with The Lullwater Company of Atlanta as manager. This company, of which Walter T. Candler is president, recently purchased the plants of the Couch Mills, Inc., at East Point and Thomson, Ga., and Greenville, S. C., and will operate them on shirting material, also manufacturing shirts, at a factory in East Point. Mr. Murphy is one of the more popular operating executives of the southern industry. He is a former member of the Board of Governors of the Southern Textile Association, and an active member of the Textile Operating Executives of Georgia.

A. LEHMANN, JR., who has been cashier at the Anchor Duck Mills, Rome, Ga., succeeds Mr. Murphy as superintendent of the Dixie mill in LaGrange.

C. H. STONE has joined the selling organization of the Grasselli Chemical Co., at Charlotte, N. C., as assistant to the general sales manager. Mr. Stone has been engaged in the dyestuff business for some 22 years and his long experience with both foreign and domestic colors will doubtless be of assistance to dyestuff consumers in dealing with dyestuff problems.



Natural Lighting is One of the Biggest Factors in Mill Planning


Hinge Member forming continuous bearing and perfect flashing
Stay Clip
Weathertight contact at all times
Wide flange for attachment of Operator
Heavy roped Sill Member

Typical sectional view thru single unit of Truscon Continuous Sash used in sawtooth of Virginia Woolen Mill loom rooms.

Natural daylighting is the principal factor in the design of a textile mill. Artificial lighting is a matter readily handled by a competent illuminating engineer.

In the loom rooms of the Virginia Woolen Mills Co. plant, shown above, Truscon Standard Windows fill the sidewalls. Long runs of fixed Truscon Continuous Sash in the sawtooth monitor flood every loom with abundant light.

This is only one of hundreds of window arrangements that can be secured. Truscon Windows may be mechanically operated if desired.

Every mill has its particular problem and Truscon daylight engineers are always ready to help you solve them. Years of practical experience in industrial designing makes their service invaluable to you.

TRUSCON STEEL COMPANY
YOUNGSTOWN OHIO

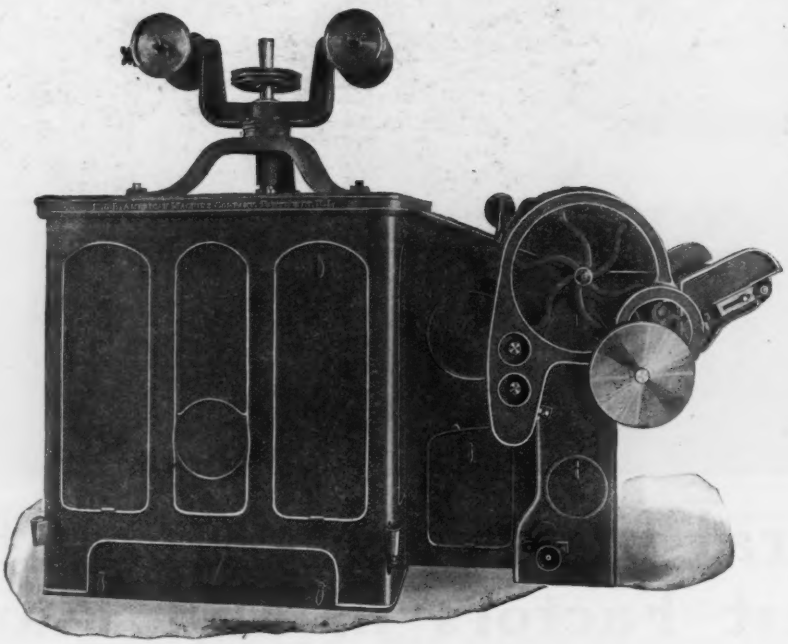
Sales Offices and Warehouses from the Atlantic to the Pacific

TRUSCON STEEL WINDOWS

H & B AMERICAN MACHINE CO.

PAWTUCKET, R. I.

COTTON MACHINERY



Crighton Vertical Opener

The SIMPLICITY of this machine will APPEAL to you.

The DURABILITY will IMPRESS you. The RESULTS obtained will CONVINCE you.

This illustration shows a single section "Crighton" Opener, complete with Balanced Rope Drive, Cage Section and Apron delivery. Machines are built without the Cage Section and Apron delivery when desired, and installations can be made with one, two or three "Crightons" in a line.

This type of Opener has been used successfully for many years in England and on the Continent, and we have made a large number of installations in this country. Its superior cleaning qualities make it an ideal machine for working low grade cottons. It also has the advantage of adaptability to almost any combination of opening equipment.

The "Crighton" Opener can be used to advantage in the Mixing Room by connecting it direct to a Hopper Bale Opener.

These machines are also built with Direct Belt Drive, Individual Vertical Motor Drive or Spiral Gear Drive to meet our clients' conditions.

Write us for further information regarding this machine for improving the Opening of Cotton.

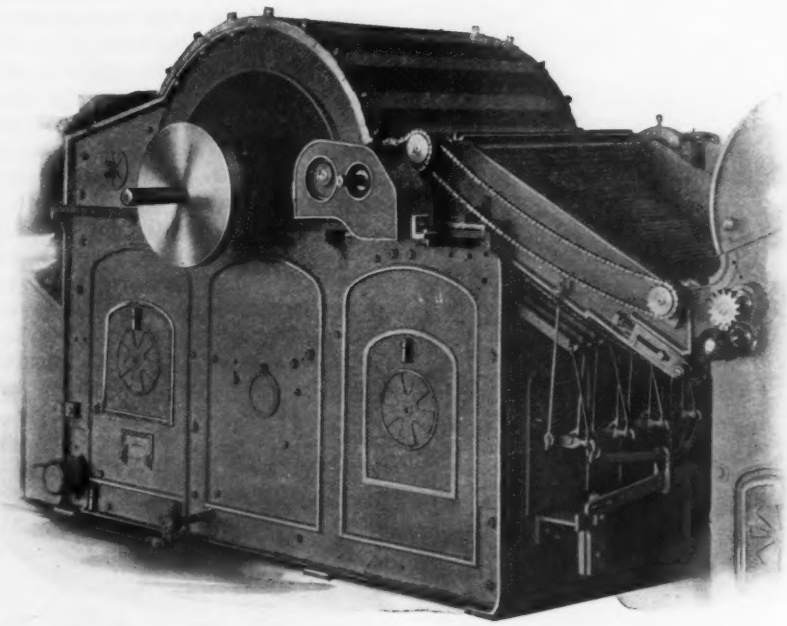
Complete Equipments furnished for

Cotton Opening — Carding — Spinning and Twisting

H & B AMERICAN MACHINE CO.

PAWTUCKET, R. I.

COTTON MACHINERY



"Buckley" Opener for Medium and Long Staple Cotton

This machine is essentially designed and built for the handling of long and medium staple cottons. The cylinder is 41" dia., and has Steel Blade Fingers arranged spirally across its entire width. The cover over the Cylinder is provided internally with a series of projections, which act upon the cotton after leaving the Feed Rolls. In the improved construction of this machine, the cotton passes over three-fourths of the circumference of this large Cylinder.

The front and lower portions of the Cylinder are surrounded by adjusting Grid Bars, which are so arranged as to form a gridded conducting channel for the cotton in its passage up to the first pair of Cages.

The front is provided with special Feed Rolls and Evener, with vertical Evener Box and horizontal cones. Ample room has been provided below the gridded surface for the accumulation of dirt, which can be easily removed through doors provided in the framing.

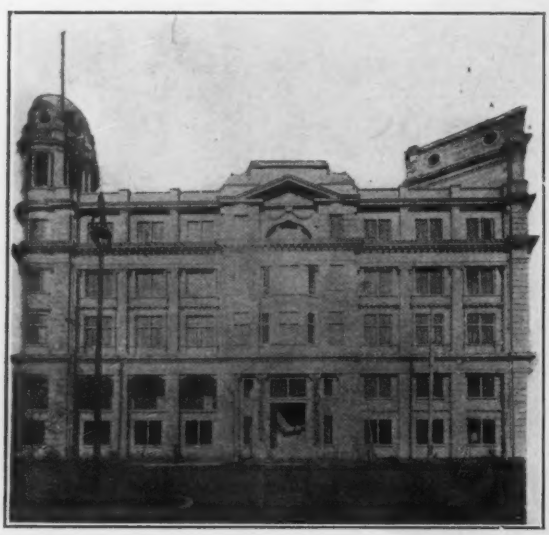
Southern Office: 814-816 Atlanta Trust Co. Building, Atlanta, Ga.

Cotton and Yarn Trading in China

BY BEN Y. LEE.

The stock exchange, which, in Chinese, means literally "business emporium," was first introduced into China through Japan in 1920. Formerly Mah Jongg, fan-tan or card playing were utilized as the means of gambling or pleasure, and were maintained in more or less private or unlicensed situations, but now, gambling in the stock exchange has assumed a new form called "business." When a person speculates he "does business," so to speak, inside of these exchanges.

In 1921, in Shanghai alone, there were over 200 stock



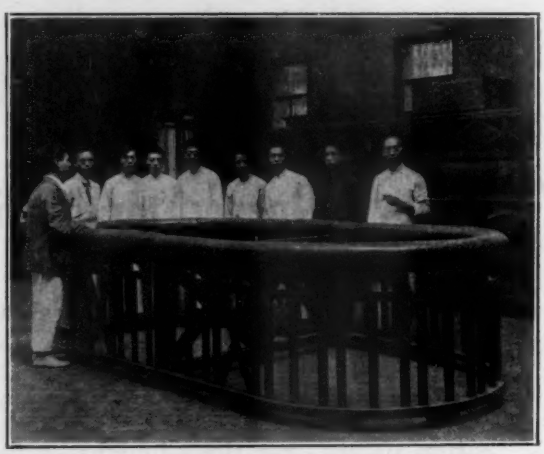
NEW BUILDING OF THE CHINESE COTTON GOODS EXCHANGE AT SHANGHAI.

exchanges of every description, whose combined nominal capital was said to be over two billion dollars. During that year, in every city in China, particularly in Shanghai, the people were frenzied about this "get-rich-quick" plan, and the result was that only a limited number of people really got rich, but thousands became either beggars or bandits. Today only about ten of these exchanges are in existence, and among these there are three which deal with cotton and yarn, and which will be considered in this article.

The first of these is the Shanghai Stock and Produce Exchange, whose initial capital was five million dollars, and this is now being re-organized. Cotton and yarn are the two principal items traded in, but stocks and bonds are also handled. Then comes the Chinese Cotton Goods Exchange, whose capital is two million dollars; this was established in 1920. This is a most prosperous one as nearly all Shanghai Chinese cotton mills and other cotton magnates have participated in and practically own it. The third is the Chinese Cotton Exchange, whose capital is over one million dollars. It was established in 1921, and deals with raw cotton only.

Business in the exchanges starts at 9:30 in the morning. There are four quotations in each session. Each session lasts about two hours and sometimes less than an hour if business is poor. The number of brokers are from 50 to 120. Nearly fifty per cent of them represent mills or cotton firms, either directly or indirectly in order to give information or make transactions for them. Each broker's cash deposit to the exchanges is from 5,000 to 10,000 taels. As the stock business is quite new here, most of the brokers are young and somewhat inexperienced. They bid according to the conditions at the time of bidding and are often ignorant of the supply and demand of American cotton, which, in normal times, is the most important single item underlying the fluctuation in the Chinese cotton and yarn market, as will be explained more clearly later. During the time of violent fluctuations of price, either due to heavy rains, severe storms, or sharp drops or high jumps of American or Indian cotton, or any unusual happening, anywhere from 500 to 1,000 speculators crowd in each of these exchanges. In such cases, it has often taken an hour or so to fix the first quotation in the morning. If anyone should think China is a poor country, he may be surprised to learn (in later paragraphs) how much an ordinary speculator may lose or win within a few hours.

The speculation in cotton and yarn is the most complicated and complex game of all the stock exchanges of China. So many unusual points must be considered before buying or selling, especially everything concerned with futures. In the first place, one should thoroughly understand the cotton market in America, then the Indian, and



ONE OF THE TRADING RINGS IN THE CHINESE COTTON GOODS EXCHANGE.

lastly the price of the Japanese yarn market in Japan. Internally, one should thoroughly understand the political conditions in the country, should know whether there will be any immediate civil war or local fighting in the various big yarn demand centers or not; whether there is any anti-Japanese boycott movement going on effectively or not; the conditions of the Chinese cotton crop, the supply and demand of yarn and cotton. Also, sometimes, groundless and sensational rumors affect the price. China imports great quantities of Japanese yarn, and Japanese yens go in sympathy with gold values, which, if violently fluctuated, have an influence, to some extent, in the Chinese yarn market.

The tradition and custom of the people to pay off their debts before each great holiday has some effect on the cotton and yarn markets. These holidays are the fifth day of the fifth moon, the fifteenth day of the eighth moon and the new year. The first is the least important of the three. The second occurs somewhere around September or October, just about the time the new cotton comes to market, a dangerous period. The farmers need money to pay off their debts either on farming or for personal obligations, and are willing to sell their cotton at whatever price is offered, irrespective either partly or wholly of the crop condition in America and India and the yarn market in Japan. Yarn merchants, too, have to pay off their outstanding debts, and sometimes stop doing business for a few days, especially during the dull period. This can be easily illustrated by what happened about September, 1922, when American cotton was quoted around 22 cents a pound, which, plus freight, duty, etc., would mean nearly $65 per picul in China; but the price of Tungchow cotton was quoted 26 taels or around $36 per picul during this period. Later, at the end of the year, American cotton was quoted around 26 cents, and the price of Tungchow cotton has jumped up to about 40 taels, or $55 per picul. Of course, during such a period, the price of yarn goes in sympathy with that of cotton, and such a cycle occurs nearly every year. This is why most Japanese and British mills in Shanghai, and some of the old Chinese mills with ample capital behind them, bought more cotton than necessary and afterward re-sold it at an enormous profit.

The new year holidays are also most critical periods in the cotton and yarn market. Everybody must pay off his debts at the end of the year; otherwise he "loses face," that is, his confidence or credit in the business world. Even ten days or so before the new year, many yarn merchants pay their debts, make preparations for the coming holidays, and stop their business. Farmers and cotton merchants sell whatever stock they have in their possession, and start over after the holidays. Mills, too, have to pay their debts, and generally clear out their warehouses of yarn in order to make the balance sheet for the year show the actual cash on hand. Speculators often need money badly and are not willing to risk too much as they have to pay their debts to the brokers in case the chances are against their favor. In other words, money is tight and interest rates are exceptionally high during the holidays. Whenever the demand for yarns is slack, or any unusual drop in American cotton happens to occur during this critical period, sensational excitement is seen in the exchanges, and the result is likely to knock down the prices excessively below what they ought to be. Indeed, this constitutes what might be termed a real "Chinese puzzle." The Chinese speculator, in order to be successful in this kind of a game, should thoroughly understand all these little and big things on cotton and yarn conditions all the world over, particularly everything concerning American and Indian cotton, the Japanese yarn market, and all of these Chinese puzzles also, otherwise he certainly may become a beggar or bandit within a comparatively short time.

Another strange cause which affects Chinese yarn prices is the boycott against Japanese goods. This happened last April when the people made a boycott in the hope of getting Port Arthur back from Japan, and to have the in-

(*Continued on page* 292.)

Make 1924 a Cheap Year For Cleaning Roving Bobbins

During 1923 a number of mills substantially reduced their cost of cleaning roving bobbins by installing Termaco machines.

A Termaco not only cleans bobbins more quickly than the hand cleaning method but it adds to the life of the bobbins. The waste is not cut off but is carded off and is kept together where it cannot be blown about the mill.

Mills have found that the Termaco easily cleans upwards of 30,000 roving bobbins each working day.

With a Termaco your mill can make 1924 a year remarkable for its lowered cost of cleaning bobbins.

The Termaco gives uninterrupted service year after year. Ball bearings are used on all high speed shafting, all gears are cut gears, heat treated steel parts are used where necessary for long life; each machine is built with only the best material and by the most skilled workmen. Each part is made in jigs and templates to afford perfect and rapid interchangeability of parts.

There are no exposed gears which might catch hold of clothing or injure a careless operator. Anyone with slight mechanical knowledge can keep a Termaco in perfect operating condition and anyone who can drop a letter in a mail box can be taught to feed roving bobbins into the machine.

The cost of operation and maintenance is a negligible item in comparison with the savings effected by the machine.

Write our Engineering Department today for full details regarding the Termaco and the lowered cost for bobbin cleaning it will effect for your particular mill. Such information will not obligate you in any way whatsoever.

TERMACO

Every machine trademarked "Termaco" is sold under a binding guarantee as to workmanship, material and operation.

The Terrell Machine Co., Inc.

ENGINEERING DEPARTMENT CHARLOTTE, N. C.

General Supply Co., Danielson, Conn., Representative for N. Y. & N. E.
(Complete stock of parts at all times carried by northern representative.)

Notes About Men You Know.

STEPHEN D. BENNETT, formerly superintendent of the Efird Mfg. Company, Albemarle, N. C., but more recently general superintendent at the new Dixie Spinning Mills, Chattanooga, Tenn., has, it is reported, returned to his former position at the Efird Mfg. Company succeeding C. G. Voss, resigned.

J. B. PARKER has been promoted from the position of overseer of spinning to that of superintendent at the Maginnis Cotton Mills, it is announced by Robert A. Morgan, agent. Mr. Parker succeeds the late J. C. Gambrell, who died suddenly on December 7th, following a stroke of paralysis. Mr. Gambrell, considered one of the abler technical men in the southern industry, had been at Maginnis for five years, going there from the Bibb Manufacturing Company, Macon, Ga., where he was assistant general superintendent.

A. MEIKLE is superintendent of the F. W. Poe Mfg. Company, Greenville, S. C. This position was held by the late Mr. Guy, and until Mr. Meikle's appointment, a permanent successor had not been named.

J. R. WIKLE, who has been assistant superintendent at at the Royal and Valley Queen Mills of B. B. & R. Knight, Inc., at Riverpoint, R. I., has been transferred to the southern division of the Consolidated Textile Corporation, with operating headquarters in Lynchburg, Va.

G. L. CHAPMAN has been made superintendent of the Woodstock Mills, Anniston, Ala.

HOWARD L. JENKINS, representing The Fleischmann Company, New York, manufacturers of diastafor, made a trip through the South recently. He is a son of Arthur L. Jenkins, of the Emmons Loom Harness Co., Lawrence, Mass.

JOHN L. MCKEE, formerly overseer of dyeing at the Stonecutter Mills, Spindale, N. C., has become connected with the Newport Chemical Company, going to the plant at Passaic, N. J., on January 1st for three or four months, after which he will have charge of the company's laboratory at Greensboro, N. C.

J. E. COPELAND, formerly at the Cherokee Spinning Co., Knoxville, Tenn., has taken the position of dyer at the Stonecutter Mills, succeeding Mr. McKee.

EDWARD B. HOOK, JR., is in charge of the Atlanta office of Lockwood, Greene & Company, R. E. Barnwell having been transferred to the new Spartanburg headquarters. Mr. Hook was formerly in the Charlotte office, where he was quite popular and successful. He is a graduate of Georgia Tech.

J. W. JOLLY has succeeded C. C. Cobb as manager at the Montgomery (Ala.) Cotton Manufacturing Company.

W. LONG has become superintendent of the Dunn Mfg. Company, Gastonia, N. C. He was formerly with the Winget Mills Co., in the spinning room.

W. L. SMITH has become superintendent of the Clara Mfg. Company, Gastonia, N. C.

H. S. HENDERSON has succeeded W. F. Smith as superintendent of the Bibb Mfg. Company plant at Reynolds Ga.

G. T. KINNETT recently resigned as manager of the Willingham Cotton Mills, Macon, Ga., according to report.

W. RAWSON COLLIER is in charge of the new offices opened by Dwight P. Robinson & Company, Inc., in the Healey Building, Atlanta, Ga. Mr. Collier, a native of Atlanta, was for 16 years connected with the Georgia Railway & Power Company. Prior to that connection he was a member of the firm of Collier & Brown, consulting engineers, Atlanta. He is a graduate of the Massachusetts Institute of Technology, and for a number of years has been prominently identified with the work of the National Electric Light Association, the American Institute of Electrical Engineers, the American Gas Association and the Illuminating Engineering Society. Dwight P. Robinson & Company are among the foremost organizations in the country specializing in the design and construction of power developments, textile mills and other industrial plants, railway shops and terminals, office and apartment buildings, and smiilar large work.

EDWARD MULLIS has resigned as overseer of spinning at the A. M. Smyre Mfg. Company, Gastonia, N. C., to accept a similar position at the Priscilla Mills, Gastonia.

W. O. HOLLIDAY is now overseer of weaving at the Walhalla plant of the Victor-Monaghan Company, Walhalla, S. C. He was formerly superintendent of the Ottaray plant of the Monarch Mills, Union, S. C.

D. F. POOLE has resigned as overseer of weaving at the Manchester (Ga.) Cotton Mills to accept a position as superintendent of weaving at the Dunean Mills, Greenville, S. C.

W. T. ALEXANDER, of Lumberton, N. C., is the overseer of spinning at the Millis Cotton Mills, Inc., High Point, N. C.

J. F. DAVIS, formerly at Charleston, N. C., has become night overseer of carding at the Kershaw (S. C.) Cotton Mills.

A. S. WILLIAMS has been promoted to the position of overseer of spinning at the Central Falls (N. C.) Mills, made vacant by the recent resignation of J. C. Hill.

A. H. HAMILTON has returned to his former position as assistant superintendent at the Eastern Manufacturing Co. Selma, N. C.

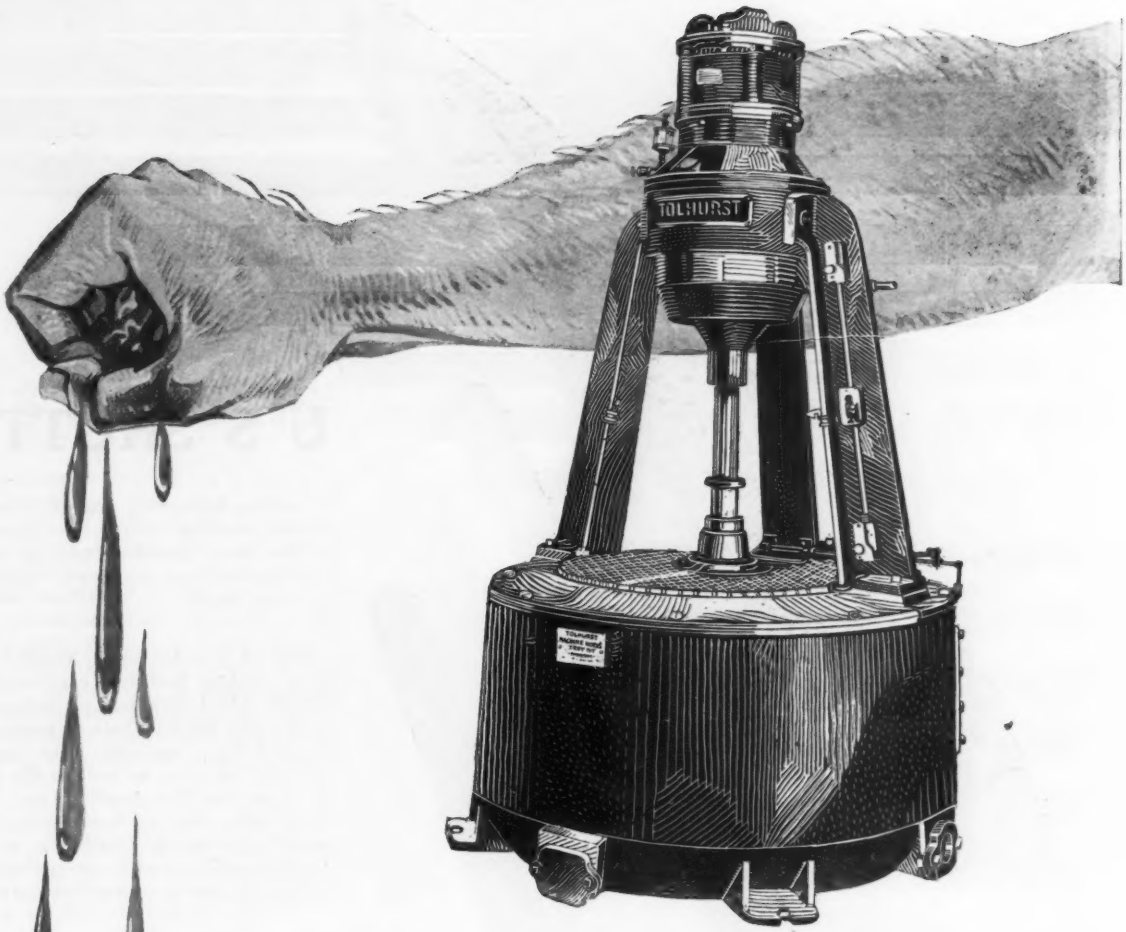
THOMAS PERRY is superintendent of the Bowling Green Spinning Company, Bowling Green, S. C., succeeding R. F. Dellinger.

J. E. WIX has succeeded R. D. Woodside as superintendent of the Palmetto Mfg. Company, Laurens, S. C.

J. T. JORDAN is superintendent of the Mary Louise Mills, Cowpens, S. C., succeeding R. H. Harrison.

ALONZO ILER, southern representative of L. R. Wattles Company, and one of the best known textile salesmen in the South, died recently at a Greenville hospital. He had been in failing health for months.

E. R. CASH, who for many years was general superintendent of the Limestone and Hamrick Mills, at Gaffney, S. C., and more recently vice-president and general manager of the new Cash Mfg. Company under construction at Blacksburg, S. C., died recently.



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MANUFACTURERS in the WORLD

Providence R.I.

Cotton and Yarn Trading in China.

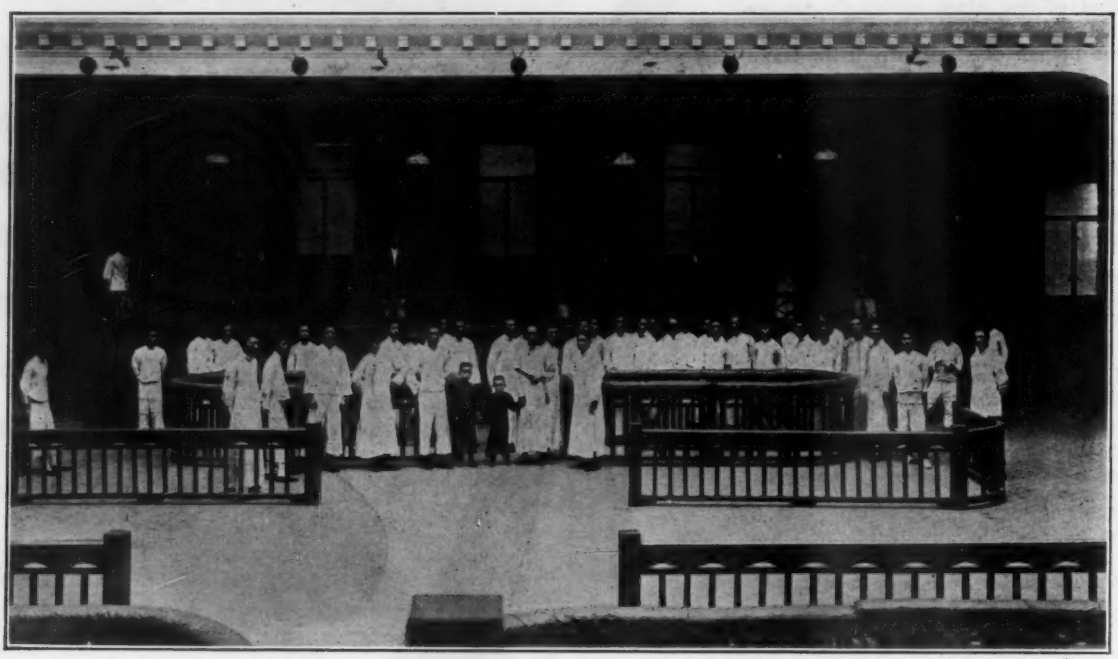
(*Continued from page* 287.)

famous 21 demands cancelled. Generally speaking, the yarn manufactured in Japan to be imported into China, is 15 or more taels higher than the same counts of yarn manufactured in the Chinese mills. Also the yarn produced by Japanese-operated mills in China is usually a few taels higher. When the boycott movement reached its zenith, the Japanese-made yarn reached its lowest levels, sometimes a few taels lower than the Chinese-made yarn. The result usually was that the price of Chinese-made yarn would be knocked down considerably, corresponding to that of the Japanese yarn. As Japanese yarn is preferred for its quality and evenness by Chinese weavers, they would buy it any way, in smaller quantity, in spite of the boycott.

During the difficulty last April, the price of yarn had dropped from the highest level, 170 taels, to the lowest, 140 taels, or around $30 per bale, within three weeks' time. That is why, in such a period, the quotation in the exchanges has been a few taels lower than that quoted by the average Chinese mills, as the Japanese mills would make wholesale reductions in their future deliveries. The biggest drop within a day's time has been around ten taels, or about $13 per bale. And in such a case the brokers have to hold meetings as to what steps should be taken to make their customers put up more margin money. It is understood many of them could not *see* their respective customers afterward, and the result was a loss to them. It has been decided by the Chinese Cotton Goods Exchange recently that after October 1st no Japanese yarn of any description shall be dealt with. Whether it is going to be effective in the future remains to be seen.

A big jump or a big drop of about $40 per bale is a "usual phenomenum" in the yarn market. In September, 1922, when the American crop was uncertain, coupled with its being the 15th of the eighth moon holiday, and the new Chinese crop just being out, the price of yarn dropped to 120 taels and afterward, until the beginning of the new year, it had jumped to 165 taels—a difference of 45 taels or over $65 per bale.

Thus one can readily see how easy or how difficult it is to make money in this game. On an average, speculators would take a risk to buy or sell 200 bales of yarn or 500 piculs of cotton. An extreme case may be taken to illustrate: A speculator may lose or make $10,000, which is quite a fortune, the income of which may enable one to live fairly comfortably, as the average interest rate here is around 10 per cent. Here is an illustration that China is not so poor a country as is sometimes imagined: A well known cotton merchant was said to have lost more than three million dollars in such speculation in the last three years! He appointed a broker in each of the three exchanges to buy or sell futures according to his instruction. He buys or sells in 10,000 bales of yarn or 300,000 piculs of cotton within a comparatively short time. But he happened to meet one of the violent fluctuations mentioned, and then he had to kiss his money and say good-bye to it.



A GENERAL INTERIOR VIEW OF THE CHINESE COTTON GOODS EXCHANGE.

So far as it is known there is not a single speculator who ever won a million dollars since the exchange was first introduced in this country.

The margin money required per bale of yarn is six taels, with 50 bales as a minimum, and that for cotton is three taels with 100 piculs as a minimum. Should the price either jump up or drop down 50 per cent of the margin money, the speculator is required to add a second margin. Should he fail to fulfill the request, his name may be listed and posted as an unworthy of confidence customer and that means he is finished in the exchange. Of course, if the broker has confidence in him, he is okeh.

The nominal commission charged is a half tael per bale of yarn and one-tenth tael per picul of cotton. The amount may be cut down 50 per cent if the broker knows the cus-

(*Continued on page* 368.)

AN OLD TIMER SAYS

It seems a strange fact that all young men wish they had inherited riches, while all history, all statistics and sound reasoning tells us that there never was a greater curse on a boy than to be born rich.

Just run through your memory now, before you say "Old-Timer" is a fool, and see how many really great men you have ever read or heard of who were born rich.

One of the most expensive things a man can have—*a bad temper.*

If you are satisfied with just a common job like the majority have, then just drift along with the crowd. But if you have got the *will power* to pull away from the crowd, to study hard, to work hard, to be loyal, to be a gentleman, you will soon be able to look *back* at the crowd and say: such fools!

Have you ever noticed that when a man gets something for nothing it does not seem to stay with him very well?

But you let a fellow deprive himself of pleasures to save a few nickles, work like the dickens while the other fellow loafs, strive for years to get his first thousand—that's the fellow who knows how to hold it.

You don't have to be a genius. Ordinary ability, backed by persistent application, by will power to never give up, and a full confidence in yourself, will get you that bigger job just as surely as two and two make four.

Young man or old man, do you realize that the opportunities for advancement in the textile business in the South are practically unlimited? There are a dozen good jobs where there is one good man to fill them.

The average overseer or superintendent is always looking for something to turn up that will get him that bigger job, when if he could only realize that the one thing to get that promotion is inside of him, so to speak.

Study your work, improve yourself by study, apply yourself diligently to *making yourself* a more efficient overseer or superintendent—that's the way to get promotion.

If luck or pull should get you a job, you couldn't hold it unless you have prepared yourself for it.

You no doubt would smile if you heard one of your operatives applying for a position as superintendent of some mill.

It is all right to set your goal as high as you please, but you must approach it steadily, surely, by definite planned steps.

I recently learned a lesson from an animal trainer.

He said that when any change was made in the act his animals were taught to do, that they would sulk for several days before they could become accustomed to the change.

I thought to myself that reasoning applies very well to mill operatives or any other body of people who are working together.

When certain methods have been used in a room or at a mill for several years the overseer or superintendent should be very careful to analyze the situation and be sure he is going to *improve* the method, or else leave it as it is.

Sometime, when you see a spider spinning its web, destroy the web, but don't kill the spider. Go back there the next day and you will find another web. Destroy that and next day you will find he has built another. To keep the spider from spinning his web you will have to kill him.

Gosh! Don't I wish I could get some overseers and superintendents to realize what *persistency* really is!

Did you ever sit before a wood fire and notice that one stick did not burn because it was separated from the others? And when you pushed that stick up against the other sticks which were burning, how quickly it went to work?

If you expect to be a successful superintendent or overseer, associate at every opportunity with superintendents and overseers who are successful.

It is a strange fact that the majority of overseers and superintendents are pessimists about good running work in *their* mills.

I'll admit you cannot make the breaking strength go up by talking good running work, but it is darn poor policy to let your pessimism get into your help.

In the heart of every man is a desire to help his fellows, but some of us are so doggone selfish with it that we do not let it come out.

I firmly believe that nothing will broaden an overseer or superintendent more than to cultivate that desire.

Some overseers sure do get things turned around.

They talk *big* and do *little.*

The Experiment

Its Use and Abuse in Business Management

Experiment is the re-creating life-blood of Progress. It is necessary when confined to new and unsolved problems in business management and control. But too often Experimenting is only another word for "Guessing"—blind striving after the right system or practice which already exists and which experience has established as exact knowledge. In such cases experiment is a costly and wasteful pastime.

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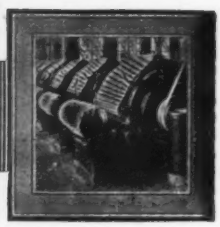
Practical Discussions by Cotton's Readers on all varieties of Mill Subjects



Desires the Cost on Mixed Yarn.

EDITOR COTTON:

I shall appreciate it if some of the readers of your "How Other Men Manage" department will advise me how to figure the cost of a 150 denier artificial silk yarn and a 30s cotton yarn twisted together. J. C. D. (Mass.)

Further Notes on Combing.

EDITOR COTTON:

Having read the notes on combing by "N. B. M. (Va.)" I wish to write some further notes on combing and at the same time refer to some of "N. B. M.'s" statements with which I do not agree.

Before cotton could be combed it was found best to feed it to the comber in the form of a lap, so for this purpose a sliver lap or derby doubler is used and also a ribbon lap machine. The object of the lap machine is to combine a number of slivers into a lap. The width of the lap on all sliver lap machines is usually an inch to an inch and a half narrower than the ribbon lap machines, so as to allow for the spread of the cotton when going through the drawing rolls of the ribbon lapper. Sliver lap machines are made different widths according to the width of the combers for which they prepare laps, the number of slivers on a lap machine varying with the width of lap, and weight of lap varying according to the wdith of the machine and the number of slivers run in the lap machine. The speed of the sliver lap machine may be from 150 to 175 r.p.m. and runs around a draft of two.

Now "N. B. M." says that the principal settings in the sliver lap machine are in setting the drawing roll guides which regulate the width of the slivers as they pass through the calender rolls and from the rolls to the spools. How about the tumbler spoons on the machine with mechanical stop motion? It is important to have the spoons and spiders set right and working accurately; for when a can runs empty at the back of the machine and the single preventer stop-motion is not working right, you are losing whatever grains per yard the card sliver weighs. Another important item to watch is the tension from the front roll to the calender rolls, or if a mill has the derby doubler, watch the tension on the table from the long calender rolls to the back drawing roll and from the front roll to the large calender rolls.

The brake on the friction pulley should also be taken care of to see that it binds and puts on sufficient pressure to make a good tight lap, and lap machine tenders should be trained to make an even break after taking the lap out of the machine, and then when laying the slivers over the spool the ends of the slivers should be kept the width of the lap. By doing so it will save waste being made and

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

the lap stop-motion on the ribbon machine will work before the ends of the lap pass through the drawing rolls. When the sliver lap machine tenders bunch their ends together when throwing them over the spool there is bound to be unnecessary waste, or the ribbon lap machine tender has to run crossed and bunched slivers through the ribbon and that causes a narrow, uneven and lumpy sheet which the machine tender naturally breaks off and then you wonder, "how come the singles."

After the lap is taken out of the machine, the tender should be also trained to turn the lap over on the lap plate so as to cause the end of the slivers to lay flat against the lap, and laps should be marked with a certain color so as to know from which machine the lap came and all the laps from that machine should be put on the same ribbon lapper then all the laps from that ribbon lapper be put on the same set of combers, so if the laps are running light or heavy, or a tender is making bad work, it can be easily traced back without going all over the section to find out the party or machine which made the bad work.

The sliver lap tender should put the laps on the creel of the ribbon machine with the ends of the lap to the front of the machine with only about one inch of the ends hanging down from the creel. This method is not only better for the ribbon machine tender, but saves waste from being made when there are four, five or six inches of the lap hanging over the creel rod.

The next process is the ribbon lapper which "N. B. M." says is not absolutely necessary and in many cases is not used because of the danger of making "singles." If that is "N. B. M.'s" reason for making that statement or the reason of any mill for not using the ribbon lapper the trouble can be remedied, for I firmly believe that the ribbon lapper is essential. The treatment given the cotton by this machine is better both for the cotton and the comber, as the drawing process straightens the fibers, the draft generally being about six, and the laying of the six webs gives laps of absolutely even section so that the comber nipper can hold firmly all the fibers; the two causes combining help to reduce the comber waste and increase the production.

As regards the web being broken when passing over the

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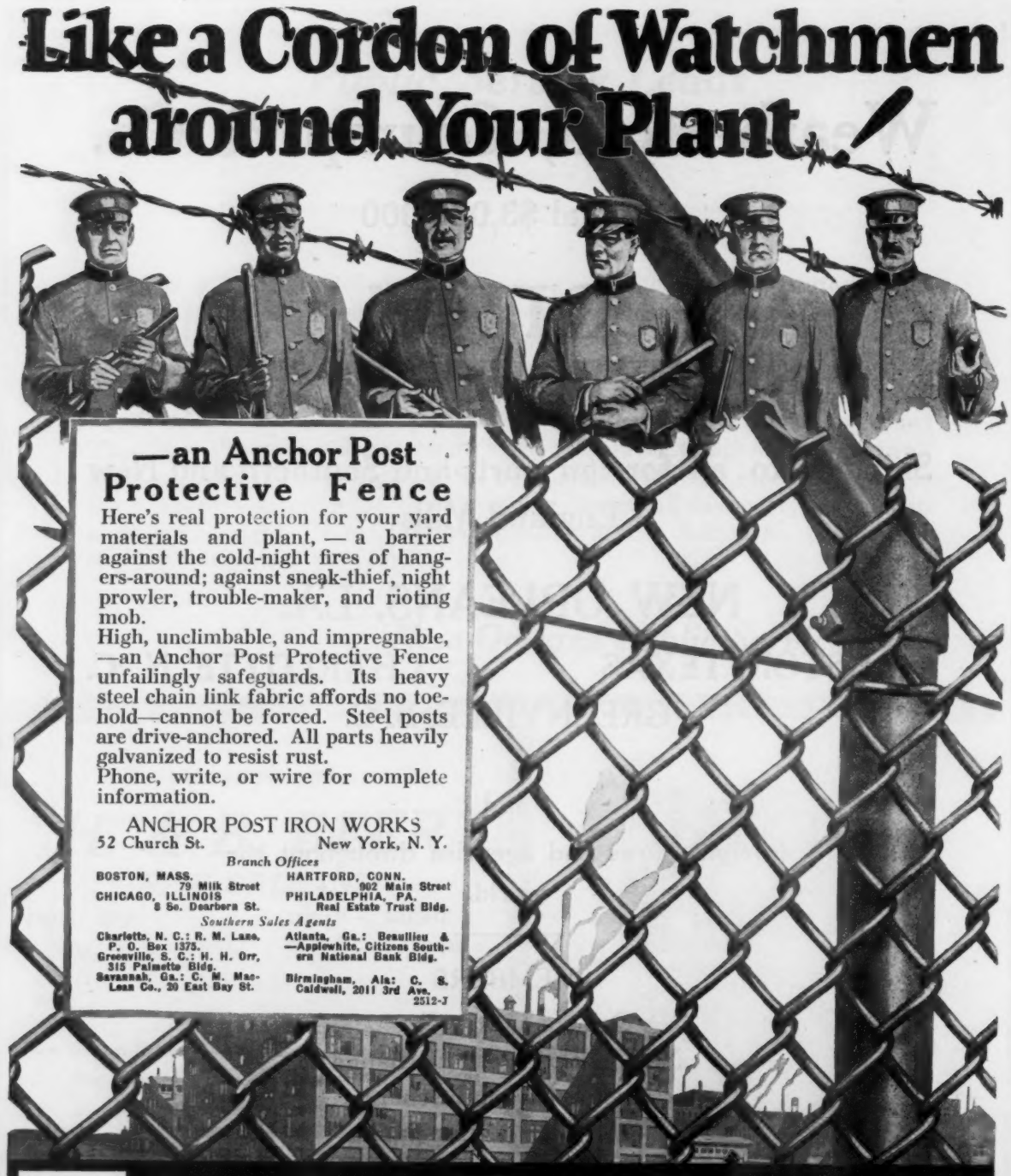

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curls of the ribbon lapper and making "singles," that can be stopped, if it is broken by the machine tender leaning over the curl when putting in a new lap, by having a small platform made, six inches high and the same length as the machine; thus the tender will not break the web when she leans over the machine.

I would like to inform "N. B. M." and others interested, that there is a stop-motion on the market for ribbon lap machines which will stop the machine whenever a roller lap occurs on either top or bottom front drawing roll. This device can be bought very cheaply. There are a number of mills in the South that have had their ribbon lappers equipped with this stop-motion. Besides saving waste, this stop-motion will save leather top rolls, prevent steel rolls from being sprung as a result of roller laps and also from having gears stripped.

If great care is taken in oiling the loose ends of the top rolls and greasing the bottom steel rolls, seeing that the leather rolls are in good condition and not binding, curls highly polished, especially top and bottom edges where the ribbons start to go over and leave to go under the table press roll, also see that there is not too much play in the bevel gears on the press rolls and that the necks of the latter are oiled. Look after the under and top clearers and see that they do not bind the table press rolls. Then there should be no trouble with "singles," providing the drawing rolls are set right and good even laps are coming from the sliver lap machine. Great care should be taken in gearing up the lap machine, in fact all machines, for if the carrier gear is meshed deep in one roll gear and barely meshed with the other, one roll is going to start before the other and vice versa when the machine stops. The back guides should be set a shade wider than the width of the lap and the front ones a shade narrower than the width of the lap. The brake should be taken care of and seen that it puts sufficient pressure on the friction pulley to make a good hard lap. When the machine tender has taken the lap out of the machine he should be trained, like the sliver lap tender, to turn the lap on the lap plate to make the end of the lap lay against the lap, mark the laps and put them on the same set of combers with the ends of the laps to the front of the combers and about one inch hanging over the creel rod. The speed of ribbon lapper may be from 250 to 280 r.p.m.

The cotton is now ready for the comber. The operation of the comber has many objects, these being to remove the short fiber, small bunches, leaf, neps and any foreign matter that may have passed through the card; to straighten out the fibers and to lay them parallel, so after the cotton has been treated by a machine of this kind, two important factors of perfect yarn are produced, fibers laid in parallel order and are practically uniform in length. The weight and the width of the lap varies according to the style of the comber. The production naturally varies according to the amount of waste taken out by the comber, the quality of work required, and the speed of the machine. To set and time anything there must be a point to start or work from, therefore the settings and timings of a comber are made from the center of the cylinder shaft which has an index wheel on the driving end of comber. The index on the Nasmith type machine is marked into 40 equal parts and is numbered from 1, 5, 10, 15 and up to 40. Attached to the cylinder bearing cap is a pointer directly over the center of the cylinder shaft so that whenever a setting is being made, whatever number of index is desired, is turned to the pointer.

The factor in the Heilman type's low production is, when the leather roll and fluted segment grip the combed fibers, the grip is so sudden that there is really a snatching action on the fibers when they are drawn out of the lap through the top comb, so that it is advisable to work a light lap, for if the bulk is too great the grip of the rolls is not sufficient to pull a thick tuft suddenly through the top-comb and make a good uniform sliver. The cause of the defective piecing and overlap on the Heilman comber is that the speed of the leather detaching rolls must be the same as the fluted segment or friction is caused that is injurious to the fiber and undesirable. It is found that a portion of the sliver backed off is wound back again before the roll seizes the tuft of cotton, so that the length wound back is lost for piecing, thus this and the position of the top roll between the top-comb and the detaching roll make the treatment of short cotton on a Heilman type comber both difficult and impractical.

"N. B. M. (Va.)" gives us a list and range of timings and settings and also a method of increasing or decreasing the amount of waste. That method is practically as old as the type of that comber and has been followed by comber men having charge of that type of comber ever since. As I stated in the earlier part of my notes the object of combing is to remove all fibers below a certain length and all other impurities; so to increase or decrease the amount of waste the objects are still the same. But the method employed by comber men on the Heilman type comber in changing the amount of waste is detrimental to the quality of work and the cotton fiber as I will try to prove.

The work of the needles on the half-lap are to comb the tuft of cotton held by the nippers which should be set at all times as close as possible to the needles without striking them. Now, how can the needles do their work when the cotton is lifted farther up out of their path and that is what is being done when the nipper knife is being set farther away from the needles. You are not combing long fibers out with the short fiber whenever the nipper knife is set close, for the tuft is held tight by the nipper. You cannot expect the half-lap needles to take out the short fibers and other impurities that the top comb holds back ready for the nipper knife to close and at the same time strike the cotton from behind the top-comb down into the path of the half-lap needles. All the short fibers, bunches, neps, leaf, etc., are not on the under side of the lap ready to fall into the needles. You have got to set the nipper so it will give the needles a chance to get them. No wonder the waste decreases, and some persons question the ability of the comber and there are complaints about the yarn.

Naturally after raising the nipper knife, the top-comb is raised and the angle taken out of the same, because if there was not, one setting is working against the other, for the reason is the top-comb is set deep and with a greater angle therefore it would hold back all the short fiber the half-lap needles did not get a chance to take out and it would be putting more work on the top comb, with danger of damaging the needles, also injuring the long fibers being drawn through the top-comb. So the results would be that the nipper knife would strike the lap from behind the top-

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comb and put the short fiber in the path of the half-lap needles and the amount of waste would not have changed. If it has, then the short fiber has been drawn through the top-comb with the long fiber and the quality of the work is changed. As I stated, the top-comb is raised and the angle reduced; the result is less waste because the needles are not deep enough into the cotton to hold back all the short fibers and impurities, therefore they are taken through the leather and steel detaching rolls with the long fibers.

The method that "N. B. M. (Va.)" gave us to regulate the settings to change the amount of waste is used because it is the quickest. To increase or decrease the amount of waste, move the nipper plate farther from or nearer to the steel detaching roll. The nipper knife should be set as close to the needles as possible without striking; to a 22 or 23 gauge, so that the tuft of cotton held by the nippers can be combed thoroughly and the rolls will grip the tips of the long fibers. Too much angle in the top-comb will subject the long fibers to a harsh treatment because the needles are hooked more and their holding power is increased and with the detaching rolls drawing the fibers through the top-comb, the strain on the fiber is greater.

In regard to cleaning and oiling, sliver and ribbon lap machines should be cleaned twice a day, top and under clearers four times daily, drawing rolls twice a day. Comber backs and fronts should be cleaned twice a day, top-combs and all top and under-clearers four times a day, tops cleaned with finger brush twice a day and drawing rolls and coiler every Saturday. Comber tenders should have two hand brushes, one for backs and one for fronts. Floor should be swept four times a day. On Saturday the feed roll should be thrown out of gear and the slivers run off the comber table into the coiler, so there will be no danger of fly and dirt getting on the work when the comber is being cleaned. Weights should be relieved on all sliver and ribbon lap machines and comber drawing and detaching rolls.

Combers should be over-hauled and reset at least once a year; top-combs reset every three months, brushes reset every three months and the comber tender should inform the comber man if any top-comb or half-lap needles are broken; also same should be looked over systematically. Every week detaching and first draw box rolls should be varnished and the rest every two weeks. When taking the percentage, 25 nips is sufficient for the Heilman type and 15 for the Nasmith. By taking more, useless waste is made. Not only should the lap machines and combers be oiled, but grease is needed. All large gears and cams should be greased every Monday and by using vaseline on the leather detaching roll necks there is no danger of the rolls getting oily and dirty at the ends; also the vaseline will last twice as long as oil. All fast running parts and studs of gears should be oiled every day, brush carrier gear stud twice a day, all slow motions once a week, and draw box rolls, if solid, the first one every day, the rest every two days and if shell once in two weeks. The oiler should carry a piece of hard waste to wipe any part of the machine where oil has over-run the bearings.

I was very much interested in "N. B. M.'s" article on combing and would certainly like to see more written on this subject. "Jock" (Mass.)

Speaking of Roving Stretching—

EDITOR COTTON:

In discussing "Where the Roving Stretches," in the November number, "C. S. (Ga.)" seems to be trying to square himself by stating that he was speaking altogether of roving after leaving the fly frame. "C. S." must be a ring spinner, for he says, "But 'Wash' forgot to mention that when a frame is run at a high speed the roving passing through the flyer has a greater balloon and less drag on the flyer, and when running slow it has less balloon and more drag on the flyer." Next he claims that the roving is more or less stretched on all fly frames. I, for one, would like to have him explain how it is possible for roving to be slack enough to balloon to stretch at the same time? Wash (R. I.)

Benzol in Bleaching.

EDITOR COTTON:

I have been told that a new process of bleaching knitted cotton goods has been discovered by which they lose nothing in weight and finish very soft and elastic. I am further informed that this is accomplished by the aid of Benzol, but could get no further detailed information.

We are having a great deal of trouble in getting the finish of our bleached knitted tubing soft enough to suit our customers. We should be glad to hear, through "How Other Men Manage," if any of your correspondents have heard of this "Benzol" system, and how it is proposed to apply it. K. M. C. (N. Y.)

EDITOR COTTON:

This is answering "K. M. C.": An *apparently* valuable method of bleaching vegetable fibers, especially cotton, was invented a few years ago by Dr. S. F. Peckham. As a result of a series of experiments made by him it was found that a solution of benzol in soap has a most remarkable cleansing effect upon cotton and was far more effective as a substitute for the lime and soda boil preliminary to bleaching (i.e., chemicking) and left the goods infinitely softer.

The proportions of the mixture naturally vary with the quality and the style of the goods to be processed, but it was found that the most successful results were produced upon heavy goods (cotton) with the following mixtures: 10 pounds vegetable oil, three gallons of benzol, and fifty gallons of water. The goods are given a single boil in this mixture, say ten hours at fifteen pounds pressure, and are then thoroughly washed and squeezed and then bleached in the ordinary way.

Dr. Peckham, I believe, prefers, when the goods are required to be soft, a solution of sodium hypochlorite made in the following manner: a cold solution of 58 per cent soda ash is added to a solution of chloride of lime, the soda ash being in slight excess, the mixture stirred and allowed to stand in the cold for at least four days. The clear of this solution is then diluted to a strength that will bleach the goods within three to five hours, say about one degree Twaddle, the goods are then washed and treated in the usual manner. No souring is necessary.

It was found that improved results were obtained if the goods were dried before immersion into the bleach, due,

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probably, to the fact that the dried condition of the goods allowed the ready access of the bleach solution to the pores of the fiber. If the claims of the discoverer can be substantiated upon a commercial scale, the process seems to possess great advantages, as it will result in a considerable saving in time.

I would say, however, that I have doubts regarding its practical application. W. B. (Maine)

A Remedy for "Ropy" Filling.

EDITOR COTTON:

I recently answered an inquiry concerning a difficulty, and it struck me that this might be of interest to some of your readers. My friend sent me some samples of roped off filling, and asked what I did with such things. "Do you cut all such places out of your cloth?" he asked, "or do you let one or two places go in on a double cut? Or do you have any places like these cords or these little bad places fixed up in your cloth room, and pass one or two of them in a double cut, or a single cut? I do not have many of them but I should like to be able to say that I do not have any of these cords in my cloth, and I suppose that about the only way to get rid of them would be to equip my looms with a feeler motion, as I am quite sure that all of these cords occur just as the bobbin is running empty. I am also sending you a sample of my filling bobbin, and will let you pass judgment on it as to whether or not it would be responsible for an excessive amount of roped off filling."

In answering my friend I said, "I think you have a very poor quill. The butt of the quill where there are no rings or ridges is almost in an oval shape. In other words, the last rounds of filling will be loose on the quill, caused from the filling pulling in the shuttle. This quill looks like it would be very liable to make ropy filling. You might help this quill some by raising the ring rail when you doff up to where the ridges start on the quill—let the frame run two or three traverses and then wind the rail down to the bottom and let the quill fill up.

"I strongly advise trying this on a number of spinning frames and letting this filling go to a certain number of looms.

"Then, be sure that your heart cams are not worn enough on the points to let the traverse dwell. Be sure that the pitman roller is turning. Take all lost motion out of gearings and shaft bearings which run the traverse motion. Watch the traverse motion to see if it has any dwell or backlash when on the change and if it has, get it out. Change the length of traverse to at least 1¾-inch stroke. Run the traverse *down* fast and up *slow*. If the spinning frames are old, I would advise speeding up the traverse at least 25 per cent. Do not allow the quill to be filled too full—make them doff and have no filling on the last two rings or ridges at the top of the quill. I would advise painting the tips of the quill down two ridges so that you can be sure the quill is not filled too full. If the quill is too full, the transfer fork on the loom will loosen the filling when knocking the quill into the shuttle and then the filling will rope off.

"I would examine all shuttles carefully to see that the spring in the shuttle is holding the bobbin tight so it will not vibrate. Have the end of the quill exactly in line with the shuttle eyes so the filling will not bind in pulling off. Of course, too much power on the looms will help to cause filling to rope off.

"Referring to the piece of cloth which has a bad place in it, will say that this kind of a bad place is very hard to fix, and I think the best thing to do would be to cut the cloth in two here, but I have had our cloth room man make two other bad places in this piece of cloth and am returning the sample to you to show where he has fixed place number one. Place number two is merely to show you what kind of a place number one was before he fixed it. This kind of a bad place will not hurt a cut of cloth and we let a place of this kind go into first class cloth where there is not more than one in 60 yards.

"If you will take about ten spinning frames and carry out the above suggestions on them and let this filling go to a certain number of looms, you can tell whether it does any good or not. If it does not show any improvement write me again, telling me just what you have done and maybe I can give you other suggestions that may help out some." Contributor No. 81.

(If any reader having the difficulty described in this letter tries the suggestions made herein for its remedy, and desires further information, if he will write us as suggested by "Contributor 81" we shall take the matter up with him for additional suggestions.—The Editor.)

Eliminating Slack Places from Short Chain Warps.

EDITOR COTTON:

"N. J. P. (N. C.)" asks in the November number for information as to the cause and remedy for slack places getting into Denn warps from the warper through boiling out, dyeing, drying, sizing, then finally drying ready for the short chain beamer to put on the loom beams.

As to the cause of slack getting into the chains, if made in links, sometimes in boiling out they do not drop out freely from the links, pulling the yarn out of position, and so with all the running of the warps through the several processes; they get pulled considerably out of the shape in which they left the warper. In the dyeing of warps, whether long chain, 400 ends, or Denn warped, 2,000 ends, there is more or less yanking and pulling, but if these are not cut or broken, the beaming of these should not be an extraordinary task for a good man who knows his business.

"N. J. P." does not say whether he is making various colors or just solids. If making one color and trying to pin beam, say 1,800 ends from one solid warp, needless to say, the slack in the warp will not be taken care of in the short stretch between the beam and the drums no matter how much tension or weight one uses. The slack will go on the beam soft, then in a few yards will appear at a different part. The writer will say from many years' experience that one will not have any trouble with slack places such as mentioned if the solid warp is split in two parts and laid-in in alternate threads or pins across the full width of the beam. Most beamers know that if running four or five colors, short chain work, these most likely would be split from the stock chains, and there would be

SPINNING ROOM DAILY REPORT

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	No.		RATE	AMOUNT
		Overseer		
		Second hand		
		Section Men		
		Oilers		
		Roving Men		
		Sweepers		
		Quill Cleaners		
		Warp doffers sides		
		Filling doffers sides		
		Band Boy		
		Scrubber		
		Spare hands		
		Warp sides		
		Filling sides		
		Total		
		Cost per pound		
		Boxes spooled		
		Yarn Man		
		Warper hand		
		Tie-in hands		
		Section man		

WARP PRODUCTION						
Frames Run	Spindles Run	No. Yarn Required	Actual No. Yarn	Breaking Weight	Beams Warped	Pounds

FILLING PRODUCTION						
Frames Run	Spindles Run	No. Filling Required	Actual No. Filling	Doffs	Wt. Per Doff	Pounds

TOTAL PRODUCTION POUNDS

Scavenger Roll Waste

Spooler Waste

Filling Waste

Frames stopped and why?

Hours run

Overseer

A DAILY REPORT FORM FOR THE SPINNING ROOM.

no trouble with slack, as splitting eliminates nearly all the defects that happen in the full warp, except breaks.

If more time were expended in preparing short chains, they could be put on the beam faster and better, giving more satisfaction, also taking the blame from the dyer of making poor work—which, I believe, is unavoidable in a case like this—and this can, I am sure, be remedied by preparing before beaming as suggested. Mack (Ga.)

A Spinning Room Daily Report Form.

EDITOR COTTON:

Replying to your request for a spinning room report form in connection with the letter of "W. H. T." in the November number, I am enclosing one that is complete and satisfactory. As the form is self-explanatory nothing further need be said. E. Y. K. (S. C.)

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From bale to bolt — from the opening room to the finishing room — Hyatt roller bearings are saving power, labor and lubricant. They are making for smoother operation and longer machine life in every department of the textile industry.
Many American textile machinery manufacturers are equipping their machines with Hyatt bearings. Increasing numbers of American and foreign mills are replacing plain bearings with Hyatts and are specifying them on new machinery.
Hyatt roller bearings are not an expense. They are investments that pay big dividends.
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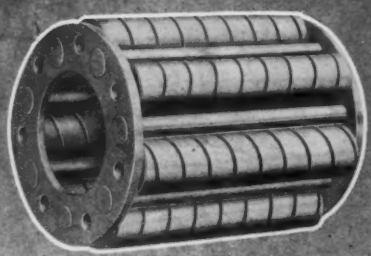
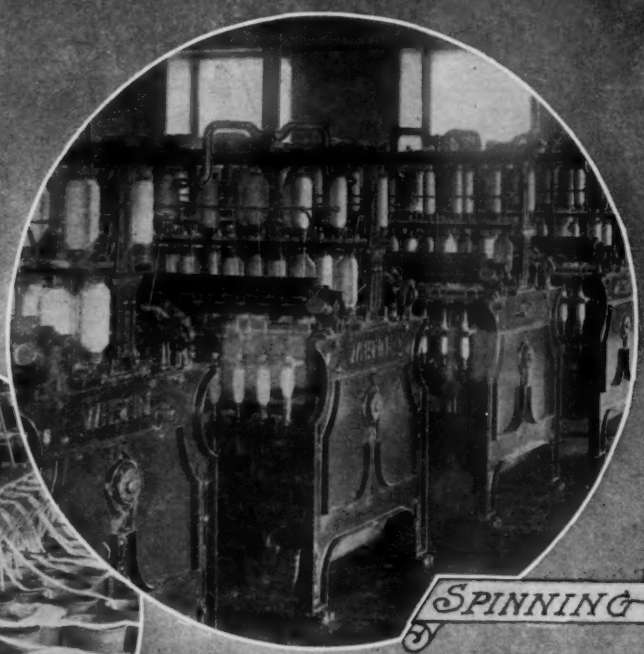
ROLLER BEARINGS



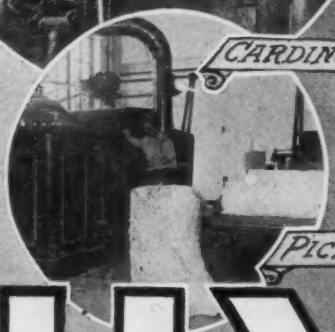


SPINNING

FROM BALE

DRAWING

CARDING



PICKING

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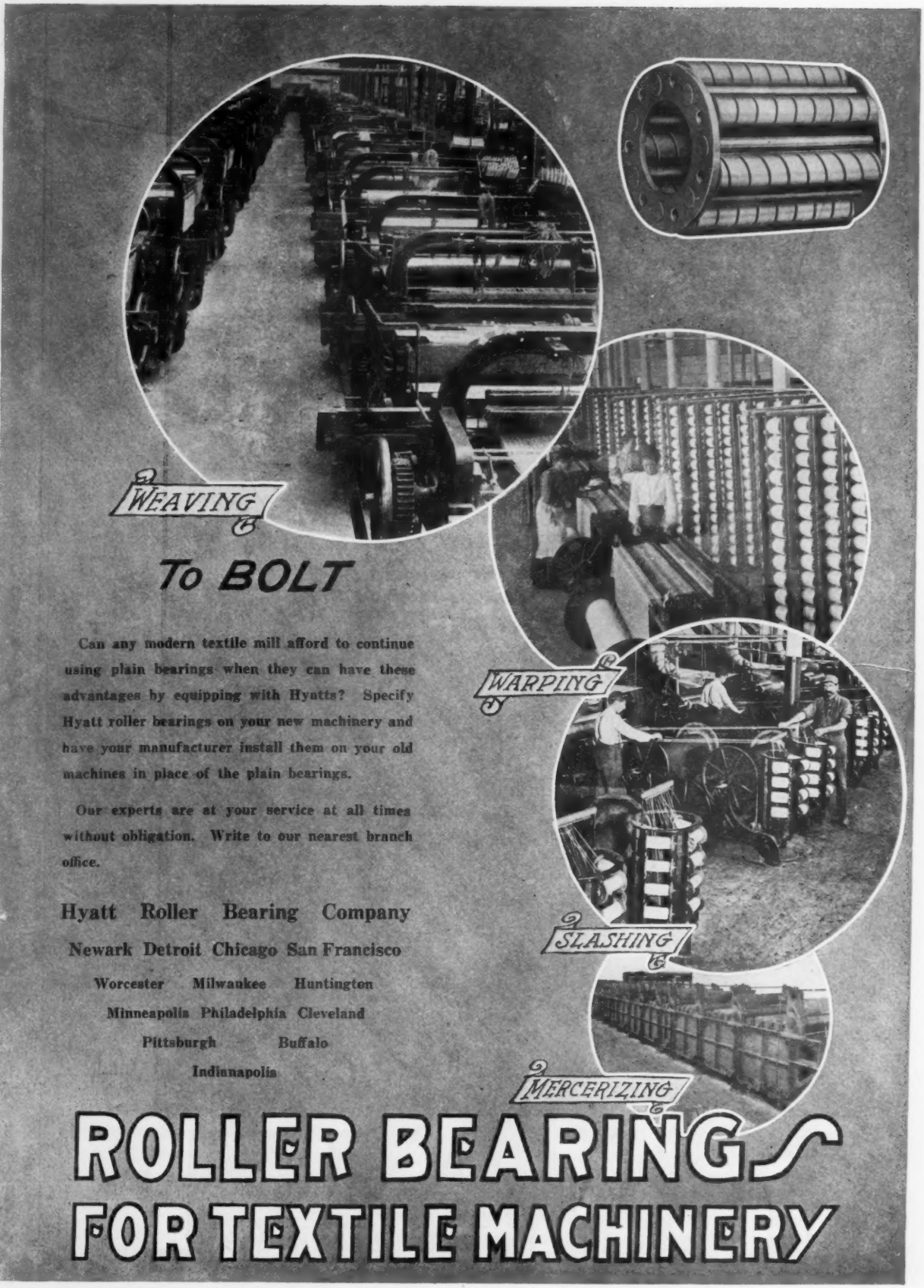

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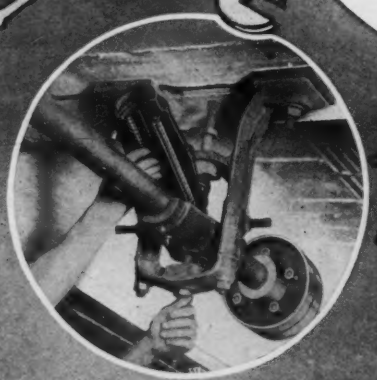

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If there is any question on this or other Hyatt bearing installations, a letter to our nearest branch will bring complete information. See preceding page.

HYATT

LINE SHAFT ROLLER BEARINGS

What Form of Cloth Inspection is Best?

EDITOR COTTON:

What form of inspection is best?

Simple as this question may seem, yet when we approach it, with all its complexes and from its many sides, we find that if we are without prejudice in the matter that this is a very important subject and one that no one could well handle in one short letter.

It is my purpose in this article to give my views without prejudice, in as comprehensive a manner as possible, hoping to draw out those who differ with me into a more liberal discussion. I would like, before beginning to discuss the question, to ease my mind of what has for many years been a sore spot in my experience, viz., the lack of consideration that mill superintendents and mill managers have given this very important process in cloth manufacture. Usually a far too limited number of very poorly paid hands are given this, the most important of all work in a mill, to do, and until this evil is removed no change of form or system can possibly accomplish complete and lasting results. I have always contended that a hand who is made responsible for the inspection of thousands of yards per day is worth just as much as the weaver who weaves a hundred yards or so, or a frame hand, or the spinner who produced the yarn for the weaver. When you consider that this hand stands between a mill and its customer, and also consider that any error he or she makes costs the mill, and costs dearly, I fail to see why mills are so short sighted with their inspectors. If they put too much cloth into seconds it costs; if too little, all of you know it costs. Would I be out of order to say that in my thirty years' experience in the cloth room, I have never seen but two mill presidents who were fully awake to the importance of proper inspection, and they both built up immense businesses, not altogether no doubt, but largely because they saw the relative importance of the proper inspection methods. It was my good pleasure to work for both these men, and I know whereof I speak.

I have digressed far from the subject in hand, but, however, not without purpose, for if you are not convinced that this premise is right, it is absolutely useless for you to read further. Unless you are willing to put competent inspectors on the job, and pay a price at which you may hope to hire such inspectors, and put enough of them on the job to do it right, let me advise you to not change from your present system, as it will only confuse matters and make errors much more common and costly. But if you are really progressive, read on—

The question asked is, what form of inspection is best? In the first place, this would have to be decided largely by the kind of goods being made, also by the purpose for which such goods was to be used, that is, a 36-inch, 48x48, 4.00-yard sheeting is to go to the counter of the retail merchant or to a bag mill, hanging threads, gouts, etc., will easily get by the retail trade, but misdraws, threads out, etc., will not. With the bag trade, the reverse is true. To the retail trade a little off weight or off count doesn't matter, but not so with the bag manufacturer. Consider ducks or drills for tents or tarpaulins—even one broken thread will not get by; but as a base for linoleum, some form of auto tires, or shoe linings, this would not constitute a defect.

The first requisite in goods to be enameled, that is covered with rubber solution, tablecloth, window shades, etc., is a smooth surface. The same goods, to be sold grey, dyed into linings or printed, requires quite a different inspection. And so on ad infinitum.

The only thing any manufacturer can do is analyze his plant and put into use such a system of inspection as will likely give the best results at the least cost, allowing reasonable pay for competent inspectors, holding himself in a position to change almost with each order, taking his cloth room overseer into close conference with him, and trying to make the goods applied on each order suit the demands of that particular order.

The generally used forms of inspecting cotton goods is so generally understood that I need scarcely elaborate on them, only to point out what I have found to be their virtues and defects, and to mention such goods as my experience has taught me can be used with them.

INSPECTING ON FOLDER.

Back years ago, when the South was first entering the cotton manufacturing industry, this form of inspection was almost universal in this section. Then we of the South made only the very lowest grades of sheetings, shirtings and osnaburgs largely to meet local demand. A little later, when our mills became more common we began to enter into competition on slightly higher quality prints, etc. Then it was the sellers began quoting two prices on goods, with "southern" goods always slightly lower than "regulars." Folder inspection was the cause of this, and because we of the South were too slow to wake up, this system of quoting separate prices held for many years and in some quarters today may still be found on higher quality goods, because the buying public has learned that we are too dollar-tight to raise the quality of our inspection until we are forced to do so—and we are the losers.

Inspection on the folder is quite all right in some cases on the lowest quality goods such as osnaburgs, sheetings and shirtings, that is to be branded and go directly upon the counter of the retail merchant to be bought a few yards at the time, at a low price, and used up into clothing by the "ignorant public." On export sheetings, shirtings, etc., for China and the Orient, as well as South America and Africa, I would not hesitate to let an honest man, running a folder at reasonable speed, who knew how, inspect on the folder. For to be perfectly frank, I would rather risk a competent and honest folder hand running a machine at slow speed than risk what is possibly the most common form of inspection in the South today, that is

HAND INSPECTION.

This is, as everyone knows, taking the cloth from the folder, usually in large pieces, 100 to 300 yards in a piece, and turning through it fold by fold until one side is inspected, and then laying the other side back and repeating the process. The curse of this is two-fold—first, the inspector, however honest, never sees, especially if rushed as the average inspector is, only from a third to three-fourths of the actual cloth, varying with the size of the bolt or piece. If the piece is small they see more, if large, they see less, and if they are not carefully watched the pieces will always be large, even if the folder hand has to pass seams, simply because the work is easier and faster for both folder and inspector.

If anyone doubts my word as to the inspector not seeing

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all the cloth, stand, unobserved, and watch the average inspector on a large bolt, say 180 yards. See how little of it he really sees and then you will know why some of your buyers send back warp knots, break-outs, etc., claiming to have found them in the goods. And, if the manager is fair, he won't cuss out his poor old cloth room overseer and his no doubt honest inspector for something they could not help; for it was something a manager might have prevented.

Another evil of this form of inspection is that one sees the face of the goods only half way, and at alternating intervals, in case it be a fancy or colored cloth many imperfections that could not be observed from the back would readily show on the face, then if the goods are to be hand picked and burled, we are up against an impossible proposition, and it is useless for the boss to sit back in his office and cuss his cloth room for things mechanically impossible. If you, Mr. Reader, doubt this send to your cloth room, get a bolt of cloth, inspect it in the usual way, mark with pencil the face, and then turn the bolt in the usual way and find the pencil marks.

The next advancement in inspection is the high board or a high roll at some point in the process of the cloth room, or as a process itself, and this is in some sense an advancement, but the various mechanisms and ideas are almost enough to make a bull puppy laugh. I have seen mills running the lightest of goods up before a window or artificial light and claiming they had solved forever the question of proper inspection. They would point out the ease with which all oil stains, etc., could be seen, but they were absolutely blind to the case with which scratch-ups, floats, hanging threads, etc., were going by.

Then another faddist would have a high blackboard, and tell you he had forever solved inspection problems by running the goods at a rapid rate over such boards behind his brushers or elsewhere in the processes in the cloth room; he would talk you black in the face about what he was saving in inspection cost. You couldn't show him how easy discolorations, misdraws, hanging threads, etc., were going by. True, thin places showed up easily, but small floats, and many other imperfections, were almost impossible to see.

Now I will not say that these forms of inspection lack all semblance of merit. But I do say that the manner in which they are usually applied renders them in many cases worse than useless and not a saving, but a useless expense. When heavy goods are run slowly before a strong light, nearly all worthwhile defects can readily be seen provided the surroundings are dark—the darker the better—and vice versa. When light goods are run slowly over a blackboard all worthwhile defects can be seen provided the surrounding space is light—the lighter the better.

This brings me to the final analysis of my discussion, viz., machine inspection. Now there are several forms of inspecting machines on the market, and I have found, at two mills where I have been employed, two very satisfactory machines made in the mill shops. One I believe better suited to the particular cloth to be handled than any machine on the market. This was a wide, heavy cloth and none of the machines on the market had sufficient reverse power, so far as I am informed, to handle it with anything like the ease of the machine devised and built by the local master mechanic.

When I refer to machine inspection I mean a machine with an inclined blackboard of about 45 degrees over which the goods are run and controlled by a foot pedal that stops at once at the will of the operator, and having a reverse that allows the goods to be run backward when there is any doubt as to any imperfection in the cloth, or where there is any burling or fixing of any kind to be done. Real imperfections or places of doubt are tagged by tieing a colored string in the selvage and are later cut out or fixed by a grader who has experience and ability so as to cut the cloth to the best advantage of the company, keeping in mind the needs of the customer. An experienced grader or cutter will save many times his wages, even though he is paid a good salary, while inspectors will often cut up enough cloth, just to save the time of fixing it, or through ignorance, to cost more than to make a proper inspection of the entire output of the plant. I have seen it done and many other cloth room overseers, who, like me, had their hands tied, have seen the same thing, though powerless to prevent it, but in many cases, they have done as I have done, encouraged their help to cut out everything doubtful rather than take a risk and possibly lose their jobs because of a system they were not allowed to change.

But I am digressing again. Inspection by machines—whether they are home-made or bought—gives the widest range of expansion of any form of inspection and, when run at the proper speed, is safest of anything I have ever found. It is the only form of inspection that in my mind may be adjusted to meet the needs of any kind of goods from osnaburgs to the finest silk. True, I might elect to inspect the lowest grade goods on the folder, or elsewhere, as conditions justified, but on this machine I would regulate the speeds to meet my needs, and I am sure that with competent help I could give a reasonable degree of satisfaction to the buyer. Of course I would not run osnaburgs at the same speed as the higher class dress fabrics, or some particular goods like enamel cloth. I would run the higher goods slower, and ducks especially slow. In fact, I have an idea that I would like to have had a chance to try out, and I will mention it here hoping some enterprising manufacturer will try it, and I would like to know of the results through COTTON.

In inspecting heavy numbered duck for pin holes, skin backs, etc.—or to speak plainer, where one or more strands of the twisted yarns have broken, there is small light holes to be scratched or pounded together, also the broken threads or skinbacks to be pulled out before such goods are ready for the highest quality tents for which they are usually used.

My idea is an inclined frame, as mentioned above, but I would remove the blackboard underneath the goods and replace it with a heavy plate glass, and below this I would place a strong artificial light evenly distributed through reflectors. On top I would have adjustable black cloth blinds that could be drawn to the selvages of the goods I was inspecting, and in my mind, every such defect as I have mentioned would be easily discerned. I would be very glad to see such a device, and cooperate in any way in developing it.

Now for a resume of the ideas I have tried to bring out in this straggling letter. First, I am unalterably against hand inspection of piece goods; second, I prefer machine inspection on an inclined frame, to all other forms; third, I would put black behind and light in front of all light

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weaves, also light in front and darkness behind all heavy goods. I would study my inspection problem not from a standpoint of saving labor, but of saving the most goods out of the seconds, shorts and remnants, and yet have the goods so handled as to suit my customer for his particular needs. T. T. C. (N. C.)

Opaque Window Shade Cloth.

EDITOR COTTON:

Will you please inform me, through the medium of your "How Other Men Manage" department, how cotton piece goods should be dyed and finished that are intended for opaque window shade cloth? We are having poor success with them; we can fill them all right with the different colors—mostly dark greens, blues and drabs—but after finishing, the threads of the goods show through as a lighter color. How can this be avoided?

I will say that we full bleach our goods for our light colors—fawns, drabs, etc., and half bleach for our darker colors—greens, blues, etc. They are then dried up and go to the opaque machine where they are filled with the colored fillings. R. A. S. (N. J.)

EDITOR COTTON:

Replying to "R. A. S." I would say that fabrics of the nature of window shade cloth should be dyed into some shade (before filling) similar to the finished shade desired. When filled without first dyeing the "doctor" scrapes the colored filling into the interstices between the threads and leaves the thread itself more or less bare and consequently lighter in shade.

For instance, a dark green window shade would be first dyed with a direct green while the blue would be dyed a shade of medium blue. Some finishers might dye both fabrics first with a gray which gives good results nearly always.

This preliminary dyeing, understand, is not for the purpose of giving a color to the finished goods, but rather to hide the cotton when the finishing color is scraped off by the doctor or wears off by use, etc.; in other words, to prevent the cotton fabric from "grinning through" which it would surely do if it was undyed. After this preliminary dyeing, the goods are passed through a more or less thick paste made of starch, in which is incorporated the proper color to give the desired shade.

The added colors must be all pigment colors, not dyes. For a blue, for instance, the basic color may be a Prussian blue shaded with a lamp black or an aniline black lake, in order to tone down the brightness of the Prussian blue. lamp black and chrome yellow.

When compounding the color paste the color mixer makes his trials by compounding these pigments in their proper proportions, as previously determined by careful trials, together with the starch paste, together with some alumina hydrate, also in paste form. A typical recipe for a green is about as follows:

36½ pounds Prussian blue
18¾ pounds chrome yellow
32½ pounds aluminum hydrate
100 pounds starch
50 (?) gallons water.

The starch is first made into a smooth paste with cold water, then boiled until the whole mass is quite smooth and homogeneous. Then add the alumina hydrate and incorporate it thoroughly into the mass by stirring and finally add the pigments. As before stated, careful trials must be made to determine the exact proportions of all the ingredients, and especially the water, since the consistency must be just right for the character of the cloth to be filled.

Aluminum hydrate, or hydroxide, is formed by precipitating a solution of aluminum sulphate with sodium carbonate. Pure aluminum hydrate is obtained by adding ammonia to a hot solution of aluminum sulphate.

The appliance by which these pastes are applied to the cloth consists of a sort of padding machine, provided with a size box through which the fabric passes, and from which it is led over scrapers or doctors and finally dried, or it may be filled on the backfilling type of machine; in either case the goods are dried on a cylinder drying machine by which one side only of the cloth comes in contact with the hot cans.

Heavily filled goods may pass through the padder two or more times in order to insure a good cover of the cloth and consequent opacity.

After being filled and dried the cloth may be coated with any other dressing, waterproof or otherwise, either linseed oil, or with casein, or with one of the nitro-cotton varnishes soluble in amyl acetate or acetone. W. B. (Maine)

Cutting Fuel Costs.

EDITOR COTTON:

The managements of mills spend considerable time figuring and worrying about the costs within their mills, planning and plotting to do everything possible to lower the cost of production, and yet they often overlook the fuel end of the mill. The power plant is a place where cost cutting effort is well worth while.

Fuel constitutes between 50 and 75 per cent of the cost of the power in the textile plant. The greatest source of power is therefore in the fuel. The most wasteful part of the power is the boiler room where the fuel is consumed. Boiler efficiency expresses the completeness with which the boiler utilizes the heat supplied to it. This efficiency has reached 82 per cent in well equipped, intelligently operated plants. In the average textile plant it is more nearly an average of 55 per cent. This means that 45 per cent of the fuel bought has not been utilized. Of this amount 18 per cent may be considered as an unpreventable loss, and 27 per cent as preventable. This loss is a heat loss.

If a coal has a heat value of 12,000 B.t.u. per pound, a fair average for textile mills the country over, a preventable loss of 27 per cent means an avoidable waste of 6,480,000 B.t.u. per ton. The boiler horsepower is equivalent to $970.4 \times 34.5 = 33{,}479$ B.t.u. Therefore, the avoidable waste per ton of coal is $\frac{6{,}480{,}000}{33{,}479} = 190$ boiler horsepower hours.

Commercially, the cost of evaporating 1,000 pounds of water in the boiler, from and at 212 degrees F. is the common way to express the evaporation performance of a steam boiler. For many years, and up until the war, the cost in coal per 1,000 pounds of water evaporated in representative progressive New England textile mills, where

power engineering has long been outstanding for economy, was about 21 cents.

An evaporation of eight pounds of water per pound of coal as fired is good performance, day in and day out. At this rate, and with coal say $8 per ton, the coal cost for evaporating 1,000 pounds of water is $\frac{1{,}000 \times 4}{8}$ cents per pound for coal = 50 cents. Considering that labor, supplies and other costs have increased almost proportionately, the reason for cost-cuttings are as twice as urgent as before the war, but more than this by far is that competition demands low power costs.

It is a well conducted power station where the coal consumed per kilowatt hour is less than 4 pounds over a year's operation; some get down to 2 pounds it is true, but these are exceptional. Yet in these stations excellent engineering talent supervises operation, highly efficient equipment is the rule, and the load conditions, which materially effects economy, are good. The usual textile power plant is not always so fortunate in the power generating end. But if the reasonable figure of 5 pounds of coal per horsepower hour is taken as a basis for estimating, it will be clear that a cost cutting campaign here is worth all the effort given it.

Now what can the superintendent of the mills do about it. First, he must ascertain that those responsible for the operation of the power plant are capable, safe men. Presumably he knows this; but if he does not there is no way of telling other than an investigation of the engineers antecedents, comparisons of the power costs, if known, with those in other similar mill plants, if such good fortune is the superintendent's, or by calling in a consulting engineer to make a rough survey and report.

Secondly, the superintendent must demand that a practical system of record keeping and record analysis be started, if not already a part of the plant's routine. No engineer, no superintendent can intelligently guide and administer power plant performances without daily keeping a record of just what the plant is doing. To try to do so is to fail, just as the company itself would fail if it kept and studied no records of production, sales and distributions of the products manufactured.

The record forms in the average mill plant are so full of the non-essential items called for that half of those which are essential are seldom entered on the form. The engineer is no more responsible for such forms than any other department head about the works. Report forms, daily, weekly and monthly, should call for essential, "brass tack" data only. Forms that are suited to one plant may not be suited to another apparently similar. There are, however, basic items which should be entered in every plant, namely, coal fired to boilers, in pounds; weight of water evaporated in 10 hours; oils, greases and supplies used by the power plant only; steam, water and electricity supplied to various parts and departments of the mill, and ampere and watt hour meter readings.

If these are recorded, and daily recording pressure and temperature charts are filled with these reports, the means are at hand for daily, monthly and weekly analysis of the power plant performance. There is no end to the data that may be worked up from this basic data.

A fault of some superintendents and executives is that they will not provide the necessary instruments and apparatus necessary to obtain this data. Rightly applied, these instruments and apparatus form an investment that is equal to and often better than any investment the company ordinarily makes. These things are fundamental in power plant economics.

Do not worry about the electricity part of the mill. All essential instruments are provided here. The electrical industry started right by putting them in when the electrical machinery was installed, and by insisting that they were necessary.

There are many, many things that must be done before power costs can be cut after the plant has all the essential instruments. They involve a working knowledge of the suitability of coals, combustions of fuels, etc. But chief of all is cost cutting, the engineers must know how to get fuel economy in the boiler rooms. Concentrate on the boiler room.

H. H. H. (Georgia)

Frame Speed and Cone Outline.

EDITOR COTTON:

In November COTTON I find an article on "Frame Speed and Cone Outline," by "H. H. Y. (Mass.)," in which he says, "In reading the various discussions in COTTON on the fly frame, I notice some contributors state that a variation in the speed of the frame requires a different outlined cone, if I understand them."

The trouble is that "H. H. Y." in calling attention to what he deems an error, does not thoroughly understand the modification of cones. In his discussion he quotes Taggart's "Cotton Spinning" as his authority.

Mr. Taggart also claims that any hesitation of the bottom cone caused stretch on all flyer-lead frames. If the readers remember, I knocked this claim out of this department. At present you will not find a single practical carder who would risk his reputation by making such a claim.

The unfortunate part of "H. H. Y.'s" letter is where he says, "I will leave out the mathematical part of the proof and just say that the curve is a hyperbolic curve regardless of the speed." But why leave out the most important part of the subject; I hope if "H. H. Y." answers this letter he will give us the outlines of a frame making 1,100 r.p.m. on the spindle and show the difference with one making 1,400 r.p.m. If "H. H. Y." will take the trouble to look up the February, 1923, issue he will find, on page 326, that I give the outlines of cones showing and proving that a heavy presser attached to a certain make of flyer, condensed the strand or roving to such an extent as to call for a bottom cone having straight outlines.

Now what is the difference? A high speeded fly frame will also condense the strand or roving. "H. H. Y." should please be reminded that the term "hyperbola" does fit in this case, there are two cones to be considered, and when the cone belt is made to move laterally one makes for a greater angle to the base while the other to a less angle.

In finding the true outline of cones, each layer of a bobbin of roving must be considered separately, and the diameters of the cones figured for that layer alone. Cones are really so many separate pairs of pulleys connected together in a continuous string.

A fly frame run at a very slow speed calls for a slacker

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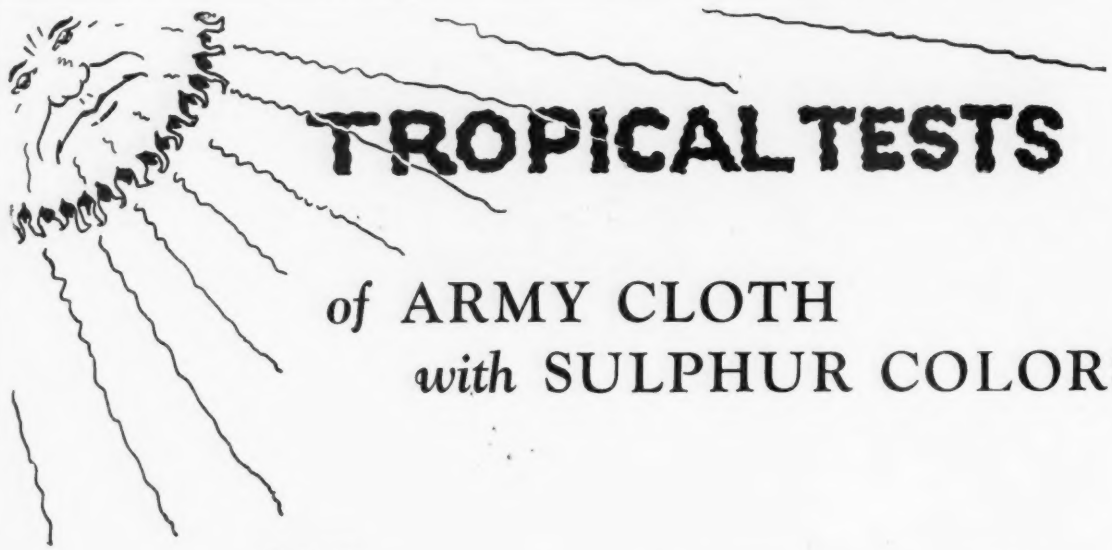

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rack gear, which means a larger movement of the rack at every change of the carriage, and at the finish of the set, the belt will be found at nearly the ends of the cones. While on the other hand a high speeded fly frame calls for a tighter rack gear, which means a smaller movement of the rack at every change of the carriage, and at the finish of the set, the belt will be found at about ¾ of the working area of the cones. Figure it out! Wash (R. I.)

Does the Traveler or the Spindle Insert the Twist?

EDITOR COTTON:

For the sake of ending an argument, will you please ask some of your contributors to show, with definite proof, what inserts the twist on spinning frames and ring twisters—whether the traveler or the spindle?

I maintain that the twisting is done by the traveler, as no twist is put in after the yarn leaves the traveler and goes on the bobbin. I admit that both are instrumental in twisting on ring frames, but do not see how the spindle puts in the twist.

Please have those answering this go into detail and prove their statements. L. R. M. (Ga.)

EDITOR COTTON:

In bringing up the question, which inserts the twist on spinning frames and ring twisters—the traveler or the spindle—"L. R. M. (Ga.)" has suggested nothing new, as this subject comes to light every little while.

In ring spinning the following conditions exist: a bobbin revolving at a much higher rate of speed than is required to wind on the yarn delivered, and a traveler introduced that compensates for this excess speed by revolving the yarn at a slightly less speed than the bobbin. Since the diameter of a full bobbin exceeds that of an empty one, and since the bobbin makes the same number of turns per minute throughout the time that it is being filled, its circumferential speed must be greater when full than when empty; consequently when the bobbin is nearly full, the traveler will be making more revolutions per minute and putting in more twist than when the bobbin is empty.

These conditions are doubtless what lead "L. R. M." and others astray and from them, they deduce the idea that the traveler inserts the twist.

Now let us assume that the front rolls deliver 471 inches per minute and the bobbin is ¾ inch in diameter. $471 \div (3.1416 \times \frac{3}{4}) = 200$ nearly revolutions of the bobbin will be taken up in winding on this yarn, and the traveler will make $9{,}000 - 200 = 8{,}800$ revolutions as it is carried around by the yarn. This will have the same effect as if 471 inches of yarn were delivered by the front rolls with the end of the yarn tied to the blade of the spindle and drawn away from the drawing rolls while making 8,800 revolutions, which would give, in both cases, $8{,}800 \div 471 = 18.683$ turns per inch.

The foregoing proves the spindle inserts the twist, for the reason that its speed is constant, while on the other hand, the traveler is governed by the size of the bobbin diameter. See the point?

That the traveler governs the amount of twist as a guide agent to prevent the coils from escaping over the top of the bobbin can be proven by the following test:

Remove the spindle from the base. Get a piece of strong twine long enough to reach the base of the spindle from the front rolls. Place one end of the twine under the front leather top roll, then down through the traveler to the base of the spindle. Make a small wooden plug to hold the end of the twine firmly to the base. Next, turn the traveler around the ring and you will find that the turns of the traveler have no effect on the twine. Then replace the spindle, break off the traveler and tie the end of the twine to the spindle blade, and turn the spindle, and it will be found that the twist will soon pull the twine from the drawing rolls. Remember: on mules there are no travelers, which proves that the traveler can be ignored in the twisting operation, but not the spindle, which is found on fly frames, ring frames, mules, twisters, winders, etc.

Wash (R. I.)

EDITOR COTTON:

Answering the inquiry of "L. R. M." as to whether the twist inserted in yarn is inserted by the traveler or the spindle: I shall endeavor to answer this question by asking a number of questions, the first of which is, If the traveler was taken from the ring and the end left up and the frame turned very slowly by hand, wouldn't twist be inserted until the end was twisted off? Second: Isn't part of the duty of the traveler that of cutting down the excessive twist?

The spindle furnishes power and speed to the bobbin and bobbin leads the traveler, therefore, all motion comes from the spindle and, strictly speaking, it would look as if the spindle was responsible for all the twist and the traveler simply an agency in the operation as is the front roll.

By very close investigation it can be positively ascertained that twist is being inserted while the yarn is going through the traveler and until it is actually wound in the bobbin.

In conclusion and in favor of the argument that twist is inserted by the spindle, I would say again that all power and speed comes from the spindle, and while the traveler, the ring, and—if you like—the thread guide, are all instrumental in inserting twist, it is really the spindle that is the cause of which the twist is the effect.

B. R. B. (S. C.)

EDITOR COTTON:

In reply to the query of "L. R. M." as to which inserts the twist on spinning frames and ring twisters, the spindle or the traveler, I will not take direct issue with him by arguing that the spindle puts in the twist, because he was so kind as to admit that both are instrumental in inserting it—otherwise, I would.

My aim will be to show the relative importance of each, and leave it to the judgment of the readers to decide which is the more instrumental.

We admit that no twisting is done after the yarn leaves the traveler, but do not see how this can uphold his theory. For, as a matter of fact, the majority of the twist is inserted long before the yarn reaches the traveler.

Spindle speed and twist per inch are directly related, so is the traveler speed. The obtained twist and traveler speed may be the closest related, for you will find more twist in the yarn on a full bobbin than you will on a comparatively empty bobbin. This is brought about by the

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The advantage over "cut mark" or "yardage" method of paying with its uncertainty of guessing and estimating is entirely eliminated when you pay by the pick. The counter has recorded all picks woven and the weaver can be paid any time without loss to himself or to the company. It settles disputes which arise over pay as the weaver can check his week's wages at any time.

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Payment by the pick rewards the workman for the actual amount woven—weavers leaving you can be paid off immediately—accurately—no argument between the crews of day and night shifts is possible.

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By being able to check his week's wages and knowing what it is at any time, the weaver becomes more interested in his work knowing that he is being paid more for increasing his individual production. And again, no weaver wants to be classed as the poorest workman, so he will exert himself to the utmost in order not to be shown up by his fellow weaver—for payment by pick the Root counter way places them all on a strictly competitive basis.

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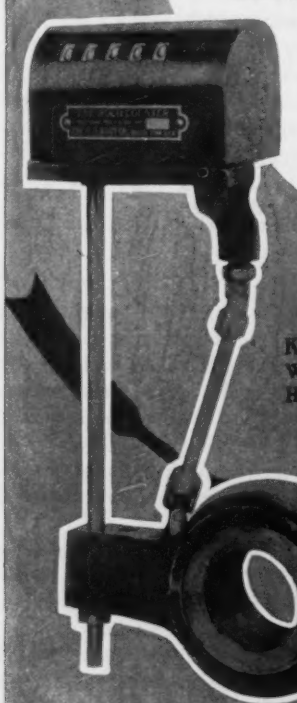
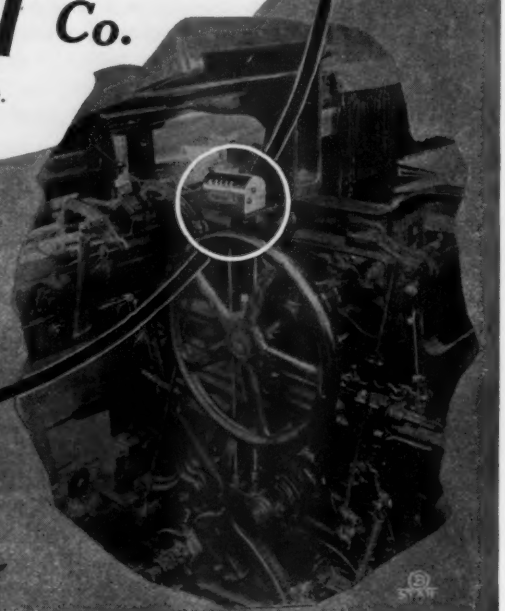
Our Engineers have successfully overcome the obstacle of vibration which heretofore has caused so many otherwise good counters to fail. Direct connection to the moving part of the loom had short life, likewise the flexible shaft, so after much research work they hit upon a plan of attaching a counter to the loom frame and drawing it by worm and gear from a cam shaft through two universal joints and a connecting rod, which has proven to be the most dependable possible way. See illustration below.

THE EYES OF PRODUCTION



KEEPS THE WEAVER AT HIS BEST



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traveler having to speed up as the bobbin gets larger to allow for the extra take-up which the increased diameter of the bobbin will give.

For example: we will say that the front roll is delivering 314 inches of yarn per minute. The diameter of the bobbin is one inch, and the spindle is making 8,000 r.p.m. Then 314 ÷ (3.1416 × 1 inch) = 100 revolutions, approximately, that the bobbin will have to make to wind the 314 inches of yarn. 8,000 — 100 = 7,900 r.p.m. that the traveler would make. This is equivalent to holding a strand of yarn 314 inches long and inserting 7,900 turns of twist in it.

Likewise, when the bobbin becomes two inches in diameter, it will only take about 50 revolutions of the bobbin to wind the 314 inches of yarn. Therefore, the traveler would make 7,950 r.p.m.

Go out in the spinning room and find a slack band. What is the result? Slack twisted yarn. The traveler seems to be acting at the command of the spindle, does it not? Now take your knife and cut a band off. The twisting operation immediately ceases. But if you stop the frame and break off a traveler, when you start the frame again, that end will twist up around the end of the bobbin, and probably deliver from the roll for a short time. You will find that the twist in this snarled-up yarn around the bobbin is very unevenly distributed.

The traveler's prime aim is to keep as near an even tension on the yarn as possible, so that the twist will be evenly distributed, and to deliver the yarn to the bobbin in such a manner that it can be wound on.

It is true that the traveler bears a vital relation to twist, but it is only a part of the mechanical arrangement necessary to carry through the operation in this case, and functions only at the command of the spindle. Therefore, I do not see wherein we can give it credit alone for inserting the twist, when just as good or better yarn can be made without the aid of the traveler.

If you could attach the yarn to the spindle and move the spindle rail away from the rolls at the rate of delivery of yarn less contraction caused by twist, you would get a perfectly twisted strand of yarn. The best illustration of this is the mule spinning frame. The twist is put in the yarn by the spindle as the carriage moves out and the rolls deliver it, and is wound up on the return operation all without the aid of a traveler.

An eight-wheel locomotive passes pulling a long train. In this case motion is set up by the eight revolving wheels creating a tractive force on the steel rails. Would you say those wheels were pulling the train, or the pistons which are reciprocated back and forth in the steam cylinders?

In ring twisting it takes both the spindle and traveler functioning together to form the complete operation. They are inseparable. However, if we do wish to separate them and give one credit for the work, I would give it to the spindle, for it governs every move of the traveler, and anything affecting it, in any way, likewise affects the twist. C. R. H. (S. C.)

I don't blame any man for believing he is the best overseer or superintendent in the country, but, by golly! he should try to prove it by his work.

Finishing Organdies and Gaberdine.

EDITOR COTTON:

I should greatly appreciate formulas for finishing organdie and gaberdine, samples of which are sent herewith, and would also like to know if it would be possible to get the same results on the organdie without using the swissing motion on the tenter. C. K. (Wis.)

EDITOR COTTON:

In reply to "C. K.": As regards the gaberdine, the goods should first be thoroughly singed on the gas singeing machine and bleached in the usual manner. After bleaching, dyeing and mangling the cloth should be dried on the dry cans and allowed to lie until cool. It is then conditioned on the damping machine and allowed to lie for two hours. It is then stretched on a clip tentering machine with or without swissing motion, after which it is ready for making up.

As regards the organdie, after bleaching, dyeing and mangling the cloth is dried. It is then starched on an ordinary two-bowled compound-lever starch mangle, using a 28-pound weight on each lever in the following starch mixture: 75 pounds corn starch, one pound of cocoanut oil, and water enough to make 100 gallons of size when boiled. Boil 30 minutes.

After starching the cloth is passed over a short drying machine and partially dried. It is then completely dried over a tentering machine using the swissing motion. This swissing motion is absolutely necessary. Nothing else will answer to get the required elastic feel. Without it the goods would simply be dead to the touch and simply stiff and wiry like book muslin.

By partially drying the goods before tentering, as described, the production can be doubled.

J. C. R. (Maine)

Some Questions for Readers to Answer.

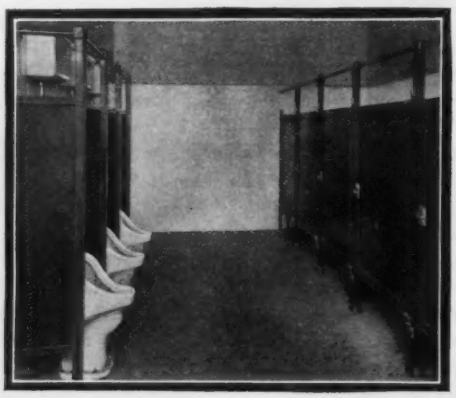
EDITOR COTTON:

I would like to ask the readers of "How Other Men Manage" to discuss the repairing of metallic drawing rolls. Mine are becoming fluted, or ridged, at the ends, which will make the ends on the frames run slack, and eventually they will be so slack that lumpy sliver will result. They are not giving much trouble yet, but I see it coming and want to be ready when it gets here.

Drawing rolls that become worn in this manner produce slack ends, the longer they run the slacker they get, thus making lumpy sliver. Of course it must be slack enough to "loop in" before it is lumpy sliver. In discussing this, assume that the trumpets are as they should be, and that the only question to be considered is the repairing of the metallic rolls.

Here are some more questions for discussion: How many have tried putting up seven ends at the drawing frame to get a better breaking strength? The custom is six up, and a doubling of six and a draft of six. It is often hard to break away from established methods, but haven't we got to venture to find improved methods?

How many have had trouble with the can tables on the drawing frames, with the slivers tilting on the sides, and



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breaking back at the slubbers? This can be eliminated by speeding up the can table motions.

What is the best speed for drawing frame rollers on a 46-grain card sliver, producing a 53-grain finished sliver for the slubbers? Contributor No. 14.

A Novel Ring Spinning Frame.

Combining the regularity and evenness of the mule-spun yarn, and its softer and fuller quality, with the continuity of production found in the ring spinning frame, the Universal Ring Spindle Co., 212 Royal Exchange, Manchester, England, have produced the "Universal" ring spindle, which is illustrated herewith.

This spindle has a number of new and novel features of construction. The yarn is spun and wound by the employment of a positively driven ring, the spindle being rotated by the drag of the yarn. A special copping motion is employed to build up the cop. The speed of the spindle is controlled by the centrifugal action of balls mounted in recesses in a disc or cup through which the spindle passes and to which it is attached. The balls are so carried that while they will act, under the action of centrifugal force, against a drag plate according to the speed of the spindle, they are carried round by the spindle and cannot roll on the disc.

One feature different from the ordinary type ring frame is that the action of the spindle rail and the ring rail are reversed. It is the spindle rail that is now suitably connected to the copping mechanism, the ring rail remaining stationery. The latter carries a number of positively driven rings which are provided with suitable ball bearings to insure easy and frictionless running. The type of ring used, evolved after considerable experiment, is provided with a driving whirl and has an upstanding collar or flange in which are formed one or more narrow slots. Each slot opens at the upper surface of the collar or flange and terminates in an eye. The arrangement is such that when the yarn is held across the upper surface of the collar or flange, the rotation of the ring causes it to pass down one or other of the slots into the corresponding eye, according to the direction of rotation.

From approximately diametrically opposite points on the upper edges of the collar two slots are cut, one being employed when the ring is being driven twist way and one when it is driven weft way. The upstanding collar is preferably made separately to the ring and of brass or gun metal. The angular tips between the upper walls of the slots and the upper edge of the collar are rounded off to eliminate sharpness and to give a flowing line to the edge of the collar, thus giving it a cam-like face which will not injure the fingers of the operative when stopping the rotation of the ring by pressing the collar with the finger and thumb.

In Fig. 1 is shown the drag arrangement applied to the spindles whereby the tension on the yarn being spun and wound may be adjusted. It will be noted that an anti-friction bearing is employed comprising balls mounted in a ring carrier. The number of balls employed depends upon the counts of yarn being spun.

When applied to Rabbeth flexible spindles the arrangement shown in Figure 2 is adopted. An inclined recess or ball race is cut as shown at A and balls B inserted. Centrifugal action causes these balls to fly outward, partly entering the opening on the ball race in the stationary bolster or bearing, thus insuring the essential drag.

Special copping mechanism has been designed to produce a yarn package of the same construction and winding as the cop produced on the mule. The object is to provide a cop that will "ready" equally with a mule cop. The mechanism comprises essentially a heart cam so designed as to effect what is commonly known as a mule "chase." In addition to this cam a secondary cam is employed which effects a locking of the yarn on the cop so that the latter will "ready" at any position in the shuttle.

Means are provided to secure proper lubrication of the ring. The action of the balls employed is such as to absolutely insure the production of a level yarn and it is claimed that breakages during spinning are almost obviated.

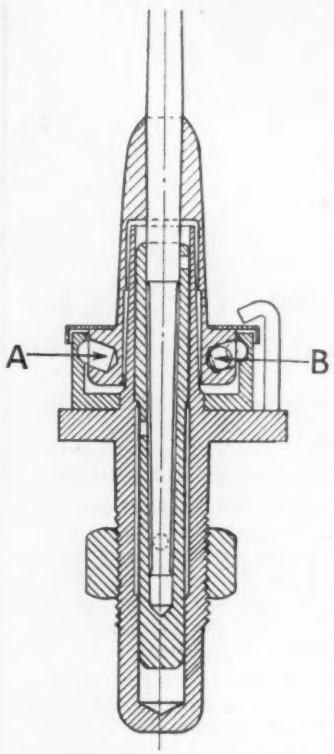

FIG. 1 ABOVE.
FIG. 2 AT THE LEFT.

Tests have proved that 30 per cent greater production over the mule can be secured of a yarn which, count for count, shows 25 per cent increased strength, it is claimed, a good level yarn being obtained. 16s yarn has been spun on this machine with eight turns per inch. Existing frames can be modified to the new arrangement and twisting and doubling is possible by the method. Either cotton, woolen, flax, or jute yarns can be spun or twisted by the mechanism, it is stated.

Newport Chemical Works, Inc., Passaic, N. J., have just announced that they are now producing Newport direct fast scarlet 4BA. The company claims this is identical to the foreign made color of this designation, that it will dye cotton and leave silk white, discharging into a pure white.

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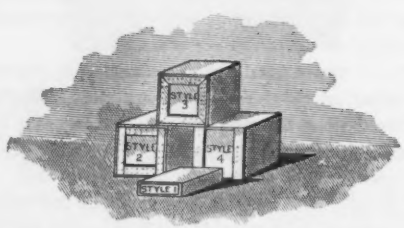

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The Cost of Balancing Flyers.

EDITOR COTTON:

I agree with "T. A. D. (Ga.)" that "Gen's" figures for the cost of balancing flyers are far too high. (He said in August COTTON that it costs from 35 to 50 cents per flyer to do the job.) He certainly was getting soaked unless it was for some special job such as changing the diameter of the bobbin or unless the flyer men provided new pressers or did something not included in the usual balancing job.

But it seems to me that "T. A. D.'s" scheme of training help for all the jobs is carried a little too far, in trying to have regular mill help do the job instead of having experts come in the mill to do it. Flyer balancing is a very skilled trade which takes years of steady work on flyers to learn properly and practically all good men at the job have put in a considerable period in one of the flyer-making shops in either this country or England. It would be all right to have a man in the mill who could put on the pressers when needed or balance an occasional flyer here and there that had been bent in some way, but when it comes to going over all the frames in the mill it seems better to get a real expert on the job. Once in ten years is enough to have the flyers all gone over and then even in a big mill it takes only a few months to do it, so what chance has a hand to learn balancing? He might get a little idea of how to do it in going over a hundred frames, but when it's a ten-year wait for the next real job, and if the hand is still alive and working in the mill he has forgotten all about it, while a man who goes from mill to mill constantly keeps his hand in and there is quite a knack to spinning the flyer correctly.

Perhaps in the South where mills are farther apart and not many in any one town it is better to be as self-sustaining as possible by having the regular help do all such work, but in New England where all sorts of repair shops and mill experts are numerous and competition for the work keen, it is not profitable to try to have everything done by home talent. At least that has been my experience, and I have seen both methods tried. Bud (Mass.)

Picker Draft and Even Laps.

EDITOR COTTON:

In the October issue "J. D. (Maine)" asked for the opinions of readers regarding the draft on cotton pickers with reference to making an even lap.

Strictly speaking, there is no such thing as draft on a cotton picker. The blows to the inch is what should be considered. To make my point clear, let us assume that the draft on any cotton picker is increased. To increase the draft we must reduce the speed of the feed roll, and when we reduce the speed of the feed roll we increase the amount of blows in the inch. Many carders have reduced the sheet of lap to one or more ounces to the yard without giving the blows to the inch any consideration, with the result of fluffy work throughout the mill. A carder need never fear of increasing the speed of the feed roll on any cotton picker, for the reason that the only harm that can result is in the sheet of lap retaining more foreign matter.

While we may say that the speed of the fan is about 1,000 r.p.m., it must be understood that only an approximate statement is made, because like many other speeds and settings, it must be determined by practical results. Generally speaking, the "air current" must carry only the cotton fibers and deposit them onto the cages and at the same time the heavier impurities must be permitted to fall through the grid or grate bars.

If then it is found that too much good fiber is deposited with the waste droppings under the beater box, it may be attributed to either the beater revolving too quickly, the grids being set too far apart or the speed of the fan being so slow as to cause a weak current of air and thus failing to carry the fibers away before they were permitted to fall between the bars.

On the other hand, if the lap from the machine contains too much seed, leaf, etc., the causes may be directly the reverse of the foregoing; that is, the beater may be revolving too slowly, failing to thoroughly open the cotton, or the bars may be too close together, preventing the impurities from passing between them, or the fan may be running at too high a speed and creating an "air current" sufficient to carry the heavier impurities with the cotton in place of allowing it to fall out while passing over the bars.

To make an even lap, the first thing to do is to obtain the desired amount of "air current." Next it is advisable to attend to the proper distribution of the same in order to lay the cotton evenly on the cages, thereby preventing one portion of the sheet being thicker than another.

Another point that needs attenion is the underdraft created under the beater, due to the small space at the end of the plate under the beater. The "air current" existing at this point will draw down a few fibers that will cling to the rough edge of this plate, and soon a large amount of stock collects, and gives the lap a ragged edge. The only remedy I know of is to fill these spaces with putty. Try it and see how it will improve the edge of the lap.

For "J. D.'s" information, I wish to point out that draft will not even laps, roving or yarn. We double at every opportunity to get a uniform thread, changing the draft will not remedy faulty places in the lap, roving or yarn, but doubling will. Wash (R. I.)

EDITOR COTTON:

"J. D. (Maine)" asked recently what draft on a picker has to do with even laps. I will suggest a few thoughts that may possibly be of interest in this connection.

The length of the lap should be considered. A bad mistake is made here in many plants, instead of having a long, light lap, they make a heavy, short one. It should be understood that the tufts of cotton must be a great deal lighter for the production of a light lap than for a heavy one and that the more the tufts of cotton are opened, the more impurities are taken out. This is also true at the card —the less fibers to the inch the lap contains the better chance the licker-in has to clean the cotton. So if a light lap is best then in order to not lose any production the proper gears to speed up the feed and also to make a longer lap should be put on the machine.

Very little attention should be paid to the draft, for, practically speaking, there is no draft on a picker. It is the blows to the inch, the so-called draft, which should be considered as important. There are still many mills which today beat the cotton too much. Beaters, as a general

rule, should not strike the cotton more than 55 blows per inch of cotton fed.

Another important consideration is to see, before the machine is started, that the space around the cages is properly covered with leather. The leather should be cut in cylindrical shape so as to fit the ends of the top and bottom cages. This is let go very often in starting a picker and today there are cases where the mills were built 30 years ago and this matter neglected, so that the cotton can be found in large tufts in the dust room and coming out at the outlets and then those in charge will tell you that it is impossible to stop this good cotton escaping to the dust room. This is a neglect that is very expensive especially at the present price of cotton. It is surprising that a mill will allow such a condition to continue when a few pieces of leather put around the ends of the screens would save many a dollar.

Getting back to the causes for uneven laps, one place is neglect in weighing the laps. The fault might also be in the automatic feeder feeding unevenly; the cone belt may be too tight, preventing the belt shipper from acting quickly, or it may be too loose, causing it to slip on the cone. The evener on the finisher or intermediate may be out of order or some of the stock may be wound around the feed rolls, thus occupying space that should be occupied by newly-fed cotton, which causes a light lap.

Here is a table of suggestions for the weight lap to be used for various counts of yarns. The lighter the lap the smaller the tufts have to be and the smaller the tufts, the more the cotton is opened and the greater amount of dirt is removed from the stock.

Number of Yarn	Weight of Lap In Ounces Per Yard
10s to 20s	12.5
20s to 30s	12
30s to 40s	11
40s to 50s	10.5
50s to 60s	10
60s to 70s	9.75
70s to 80s	9
80s to 90s	9
90s to 100s	8.5
100s to 120s	8.5
120s to 150s	8

I will now give a good rule for figuring the length of lap desired. We will say that the bottom calender roll is seven inches, the worm single which counts one, the gear on the lower end of the angle shaft 21 teeth, and the knock-off gear 30 teeth. First, find the constant, which is obtained by leaving the change gear out and can be used to advantage forever after:

$$\frac{30 \times (1) \times 7 \times 3.1416}{21 \times 1 \times 36} = .8726 \text{ Constant.}$$

Now suppose we want to make a lap 52.5 yards long. All that is necessary is to divide the constant into the length of the lap desired, which would be the length 52.5 divided by .8726, giving 60 gear, or, if we want to know how many yards a certain gear will produce, use the following example: $.8726 \times 60$ equals 52.35 yards.

Having found the length of the lap it is always an easy matter to find the weight of one yard of the lap in ounces. Suppose the lap at the breaker weighs 39 pounds. We then have the following calculation: To find the weight of one yard of the lap in ounces, 39×16 equals 624 ounces, divided by 52.5 equals 11.88 ounces to the yard. This is the only calculation necessary.

To give the proper draft desired on the card to draft a picker from the feed roll to the calender rolls is all right in theory, but not in practice. Besides, much time is saved in the foregoing method, as I have stated before, the drafts of a picker should not be taken into consideration, rather the blows to the inch. To find the blows to the inch of cotton fed, multiply the diameter of the feed roll by the revolutions per minute of the feed roll and by 3.1416, and divide this into the number of blades times the revolutions per minute of the beater:

EXAMPLE.

Diameter of feed roll..... 2.5 inches
R.p.m. feed roll..... 9
No. of blades on beater 2
R.p.m. of beater 1300

$$\frac{1{,}300 \times 2}{2.5 \times 9 \times 3.1416} = 36.78 \text{ beats per inch}$$

I suggest the above number of beats per inch for one-inch American cotton. At least a part of the unevenness will get by the evener before the evener has time to act upon it, so all the minute details I have tried to point out in this letter should be watched closely. Watch the beats per inch, the opening, and the hopper on the breaker—see that this is at least two-thirds full all the time.

Bab. (N. C.)

Southern Carders Meet at Charlotte.

(*Continued from page* 270.)

many are using the Murray opener? F. C. Todd, superintendent, Ruby Cotton Mills, Gastonia, N. C., said he has one, and related his experience: "I have had it in for only a few months. I have never had any experience with the vertical opener, but from my experience with the Murray opener and what I have seen of the verticals, I like the Murray better. We average about three pounds to the bale—and it's all dirt—on middling cotton. The superintendent of a mill just up beyond mine has a vertical opener, has had it for quite a while, and he saw my Murray and got him one and put it in tandem with the vertical opener, and he gets about two pounds a bale out of the Murray after it goes through the vertical opener. I would like to have the Murray in tandem. Since I put mine in my breaking strength, on 38s, increased about two pounds. We formerly ran the cotton direct to the No. 4 bale breaker and then to the picker room."

J. E. Robinson, overseer carding, Wateree Mills, Camden, S. C., next related his experience with the Murray. He said they have had one in about three months, and get about three pounds of dirt to the bale, and are enabled to run inch-plus cotton, resulting in quite a saving to the mill. He stated further that since using the Murray they have been enabled to eliminate the intermediate pickers as well. "We are very much pleased with the Murray," he said, "and we are getting good results from it."

Mr. Robinson next described his system of opening. He expressed the opinion that ageing cotton is most important where a man has the room to do it. He opens 26 bales at a

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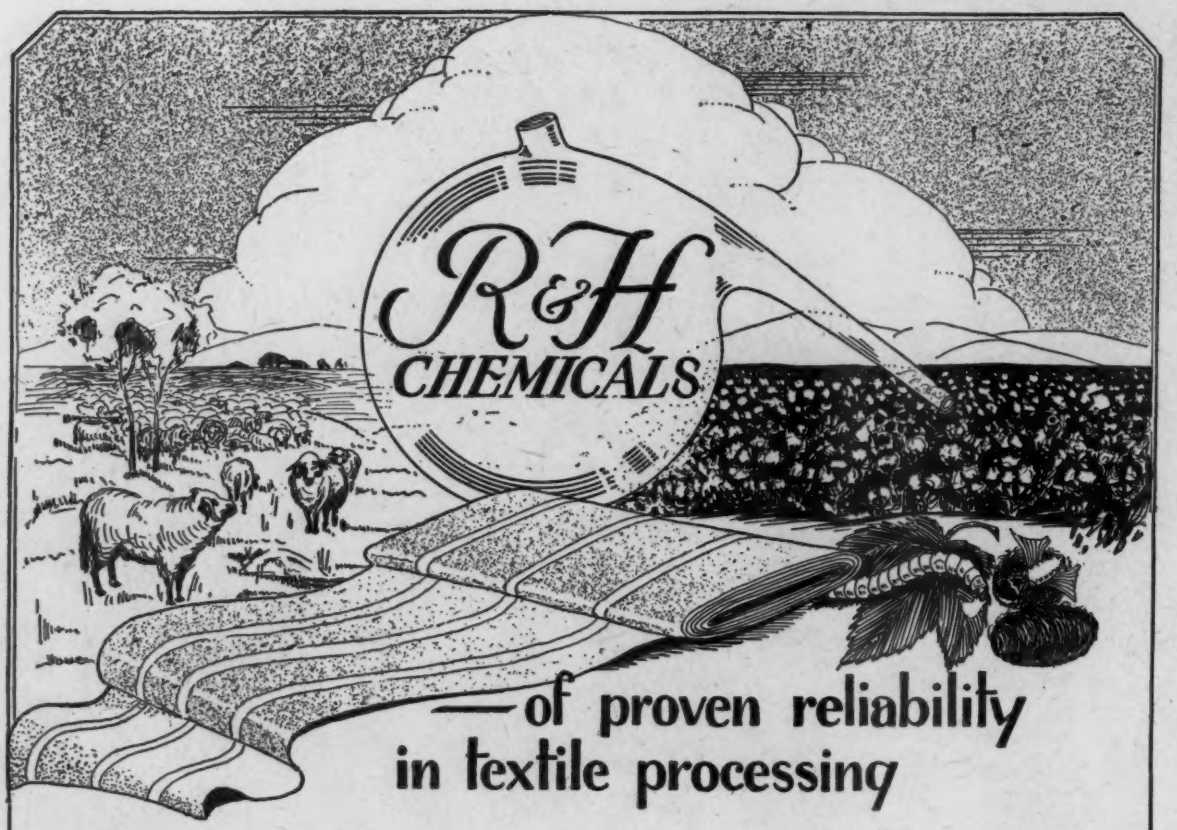

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time, and places the bales on the floor, numbered, with tags to correspond hanging on the wall. The cotton is watched carefully for defects and damages, and by the "check system" the source of the cotton is determined and proper claim made. Mr. Robinson said that mills could save themselves considerable money by a careful watching of the cotton as it comes in in this manner.

Touching on this subject, T. W. Harvey related a war-time experience. "When I was with the Millen Cotton Mills, during the war period, I was making 8s yarn and got short of stock. I went to Mississippi and bought 1,200 bales of high-density compressed cotton and brought it back and when I got it to the mill I didn't know what to do with it. Before we could handle it we had to send off for a No. 4 bale breaker to be sent by express, collect. When that came in and we got it going we put the cotton through it and the mill, we made yarn, and sold it, and got the money for it. I had been using middling cotton, which at the time cost forty cents—and I got this for nineteen!"

Mr. Lehman, of Huntsville, at this point described a cleaning machine which he has got up. This consists of a two-bladed beater, about ten inches from tip to tip, with about fourteen fingers. It is inserted in the conveyor pipe with the fingers revolving at right angles to the flow of cotton. The stock is caught by the blades, carried down against some grids at the bottom of the machine to remove the foreign matter and then passes on through the pipe. The machine has a trough at the bottom to catch the foreign matter. A one-horsepower motor operates it, said Mr. Lehman. The machine measures about 28 x 10 inches.

This machine is operating at the Merrimack mill, Mr. Lehman declared, "and we dump out twice a day about a bushel of leaf and trash."

Variation in Length of Picker Laps.

At this juncture the chairman directed the discussion to the subject of the evenness—or unevenness—of picker laps, requesting the reading of the reports of tests which had been made prior to the meeting in accordance with a blank sent out before the meeting. Perhaps in connection with this discussion a little history might not be amiss.

About a year ago, at a meeting held by the Carding Division in Anniston, Ala., B. R. Burnham, of Whitney, who was at that time the division chairman, brought up the matter of picker lap lengths, declaring that several men, in making experiments and tests on this, had found, as an instance, that a lap supposed to be measuring off 48¾ yards, was varying in length from 42 to 52 yards. This statement aroused considerable interest, and the chief suggestion for the remedy that was made at that meeeting was the scraping of the friction on the brake shoe.

Since the Anniston meeting, considerable interest has been evinced—doubt, in most cases, until the tests were made!—and the result was that prior to the Charlotte meeting, Chairman Corn sent out a blank or questionnaire, asking that the men make tests on the lengths of laps for two days, and report at the meeting, as to the variation found.

Mr. Campbell reported he had made the two-day test, on three machines, making four measurements a day, at 10, 12, 2:30 and 4:30 o'clock. The first day his humidity was between 66 and 67 per cent, and he had an average variation in the twelve laps measured of one yard and two inches. The longest was 58 yards 8 inches, and the shortest was 54 yards 6 inches—the lap standard being 54 yards. On the second day his reported average variation was 18 inches, the humidity being around 66 and the weather being clear. (The previous day had been rainy.)

Mr. Touchstone's standard was a 47-yard lap. His variations during the two days, from three machines, ranged from 48¼ to 50 yard lengths.

J. S. Santell reported on a test made with two machines, on laps supposed to measure 52.47 yards. "Our experiments for the first day, which was rainy, showed a variation from the low of 53.14 to the high of 53.62 yards. The second day was clear, and the shortest lap was 53.14 yards and the longest 53.64 yards."

A variation of one yard the first day, and 1.36 per cent the second day, rainy weather both days, was reported by John B. Jones, Jr., assistant testing engineer, Shawmut Mill, Shawmut, Ala. Mr. Townsend said his variation, testing on three machines, was as follows: first machine, from 50 to 51 1-3 yards, or one yard and 12 inches; second machine, from 50 1-3 yards to 51 2-3 yards, or one yard and 12 inches; third machine, from 50 2-3 yards to 52 yards, or one yard and 12 inches variation on each machine. This first day was clear. The second day of the test was rainy, and these were the results: first machine: 51 yards to 52 yards, or one yard variation; second machine, 50 1-3 to 50 2-3 yards, or twelve inches variation; third machine, 51 to 51 2-3 yards, or twenty-four inches variation. The chairman read other reports sent in which showed about the same percentages of variation reported. Mr. Chapman's report showed somewhat wider variations in lap lengths.

The next discussion was with regard to the method of measuring the laps for length. The common practice seemed to be to roll the laps out on the picker room floor and measure them with a tape. From the discussion it appeared that this was an unsatisfactory and more or less inaccurate —back-breaking, as well!—method of doing it, because of the likelihood of slipping and stretching the lap. In the discussion of improved ways, S. B. Whittier, assistant manager, Whittier Mills Company, Chattahoochee, Ga., said, "I saw this at the Lowell Textile School: they took an old picker screen and set it up in a rack and put a handle on it to turn it with, and then they took a steel tape and measured the circumference of the screen. Then they placed a lap in a rack and measured it by turning the screen. Their variation was around 12 and 14 per cent."

Mr. Touchstone described a system of measuring laps which he has devised. He said in his opinion the proper way to measure is to have the lap unroll in the same way in which it would unroll at the back of a picker. This he did by rigging up a picker apron with a roll and crank-handle on one end, then the lap is rolled out onto the apron, above which, from one side of the apron to the other, are stretched two wires, exactly one yard apart. The lap is rolled out until the end comes to the second wire, and a piece of colored chalk touched to the first wire, which produces a mark at the end of the first yard of lap. Then the lap is moved on until this chalk mark is under the second wire, when the first wire is touched with the chalk to make the second yard-mark, and so on throughout the length of the lap.

Getting into the discussion of remedies for the unevenness in picker laps, the first statement was made by W. N. Williams, superintendent, Wampum and Laboratory Mills, Lincolnton, N. C., who said "I was having a lot of trouble,

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and I found that the yoke that goes around the roll and holds the worm shaft had become worn and I could see the shaft working. I put a bushing in there, and where I had been getting a variation of 2½ yards, this cut it down to ½ yard."

Mr. Touchstone described the next remedy: "The yoke that the knock-off lever passes up and down in was so wide that it allowed it to play back and forth, causing it to drop off perhaps earlier at one time than at another. I took off the knock-off lever and pawl where they work together, and inserted a steel tempered plate, which will cause them to drop off at the same point every time, with a screw inserted into the yoke that will hold the knock-off lever to a certain position in the yoke, not allowing it to work sideways."

The same remedy was reported by Mr. Campbell, who added that he went a little further and found some of the trouble due to the friction shoe; and that part was also caused from the lap pins in the logger-head.

F. L. Drake, overseer of carding, Olympia Mills, Columbia, S. C., heartily endorsed what Mr. Campbell said, adding that extreme vigilance in caring for the gears and friction in the logger-head was essential.

The chairman asked whether anyone had tried using cork in the friction instead of leather, but nobody reported that he had.

Mr. Harvey wanted to know if anybody had made the lap-length test on a new machine. Mr. Drake said he had, and that the best he could get was a third of a yard variation.

"I wonder, while we were measuring the laps, if anybody got the variation yard by yard and weighed each yard," suggested Mr. Dilling. Mr. Touchstone said he had done this, using a good pair of scissors for cutting, and that his variation on a 49-yard, 11½-ounce lap was ¾ of an ounce, the weight of the individual yards running from 11 to 11¾ ounces.

The chairman asked the general question—and said it would be a mighty good one for future discussion—"How many have tested the yard for yard variation, and then put three or five laps on and tested that? It isn't the total variation throughout the lap that counts so much," he added. "It is the yard by yard or inch by inch variation. You can have a lap that has a two-pound variation as a total, but if you have a lap that has an ounce variation from one yard to another, you will get a good deal worse result than with the two-pound total variation if the yards run even."

Mr. Drake said he had made an extensive test on this, on a 13½-ounce lap 45 inches wide, and had found an average variation of ¾ of an ounce, using three, four and five laps on the back of the finisher.

The morning session was brought to a close at this point, and at one o'clock the members assembled for the regular

Dutch Luncheon

which in itself was delightful, and which was refreshingly embellished by cabaret entertainment supplied by a musical comedy troupe. Several Charlotte firms contributing to the expense of the entertainment.

After the entertainment, the men went back into the meeting hall for a resumption of the discussion, and the first subject upon which the chairman asked experiences was that of beats per inch in the pickers. Mr. Campbell,

of Greenville, told this experience in changing the blows to the inch:

"In our mill we were running coarse work, and on breaking strength were up to Draper standard—this was on 8s to 16s. Business got bad on that work, though, and we changed to a weaving mill and started spinning 30s warp and 41s filling, and therefore we threw out some of the coarse speeders and put in jacks for the finer work.

"After we had made the change, we found that our breaking strength was away down, and we couldn't find the trouble. There were no drafts changed, and our carding was lighter, so we went to the picker room and began to change there—this was the last change I made in the picker room.

"On my first picker, with two beaters to the machine, to which the cotton came from the opener, the first beater, a 20-inch, three-blade beater, I found I was running to hit the cotton 51 beats per inch. I changed that to 64 and I increased the beats on the second beater—a two-blade, 18-inch beater—from 36 to 37. (It is not necessary to give the revolutions per minute of the beater unless you want it.) The finisher beater, a three-blade carding beater, was hitting the cotton 100 beats to the inch, and I changed that down to 65½ beats per inch.

"Before the change in beats per inch, on an average number of 29.88s, our breaking strength averaged 53½ pounds—that was away under; it should have been about 63 or 64 pounds. On a report I got yesterday afternoon at four o'clock from the spinning room—and you know they always make it as low as they can—on an average number of 30.01, the breaking strength was 62.25. Nothing else in the mill was changed except what I read you on the beats per inch."

Mr. Harvey asked for the beater speeds. Mr. Campbell answered: "I was running the three-blade plain beater 980 hitting it 51 beats to the inch, and I increased that to 64; on the same machine the second beater was running 1,160 r.p.m., beating 36 beats to the inch, and I changed to 1,360 and beat it 37. The finisher carding beater was running 1,200 and hitting it 100 and I cut it down to 1,025 to get the number of beats to the inch to 65½."

It was brought out here that while Mr. Campbell did increase the number of beats per inch on his first two beaters, the reduction on the Kirschner beater was sufficient to bring the total number of beats in the pickers down from 187 to 166.

L. D. Williams, overseer carding, Highland Park Mfg. Co., North Charlotte, N. C., reported that since the installation of the Murray opening machine, and a porcupine beater in the breaker picker, he had been able to cut down the beats per inch on the carding beater in the finisher with the result that his breaking strength increased around six pounds.

At the Granby plant of the Pacific Mills, said Mr. Touchstone, "we are running 161 total beats on three processes; the breaker, 28; intermediate, 64, and the finisher, a carding three-blade beater, 69. The breaker has a three-blade plain beater."

"We are running a porcupine in the breaker 720 r.p.m., and a carding beater in the breaker giving it 18 beats to the inch, and 62 strokes per inch in the finisher, with a speed of 1,000 to 1,050 for the carding beater, and by many tests we have gotten a better breaking strength by about eight pounds," said J. E. Robinson, of Camden.

Rogers Davis called attention to the fact that while Mr. Campbell had increased the beats per inch on his first two beaters, he had a much thinner sheet of cotton, and pointed out the effect of the various sizes of feed rolls.

"We have two processes of picking—the breaker is a double beater machine," said Mr. Drake. "We have a 20-inch, three-blade beater in the back and are getting 34 blows per inch there. On the front beater, which is a 16-inch, two-blade beater, we get 28 blows per inch. The three wing carding beater in the finisher beats it 69.01. We are running on 29s yarn, running inch to inch-plus cotton, and the breaking strength is right around 60 pounds. I think that Mr. Campbell increased his breaking strength by the reduction of beats in his finisher beater."

Mr. Corn asked whether anyone had tried the use of a carding beater in the double-beater breaker, with a blade beater as the second. No one said he had.

The next feature of this session was the reading of a paper by Don D. Towers, of the Saco-Lowell Shops, who discussed the matter of uneven lengths of laps from pickers, and the causes and remedies thereof. Mr. Towers prefaced his remarks on this subject by a statement in connection with vertical openers. He said that when he was superintendent at the Canton Cotton Mills, in Georgia, he had the first vertical opener in that state and one of the first in the South—back in 1912 and 1914. This was the English type Crighton machine. Because the cotton was so much better opened, the laps so much more even, said Mr. Towers, the breaking strength of the yarn went up 10 to 12 per cent, and he added that in every mill with which he has since been connected, he has had vertical openers. "In one mill of 16,000 spindles on coarse numbers," he said, "which had intermediate and finisher pickers, I put in a vertical opener, changed it to two processes of picking and put eveners on the breakers, and our breaking strength and production jumped up to where we started using middling and strict low middling cotton where we had formerly run middling and strict middling."

Mr. Towers' paper on the subject of picker lap lengths follows:

"At your last meeting a statement was made by one of your members that he had found wide variation in the actual length of laps taken from different finisher pickers that were supposed to be alike. As a representative of the Saco-Lowell Shops I was asked to discuss this point along with the general question of unevenness of laps.

"Theoretically, a picker should knock off at the same yardage each time, unless the gears are changed, but in practice there may be some variation caused by conditions which cannot be absolutely controlled. First, there is the friction under which each lap is wound. A change at this point will affect the length, a hard lap will measure longer than a soft one due to the greater tendency of a hard wound lap to stretch while being built.

"Second, the knock-off latch lever and drop lever may become worn at the point of engagement so that the actual knock-off may not come on exactly the same tooth each time; in which event, if the lap measures long, the next one will be correspondingly short.

"Third, the worm on the end of the calender roll, which drives the shaft operating the knock-off mechanism, may become so worn as not to mesh properly thereby causing a

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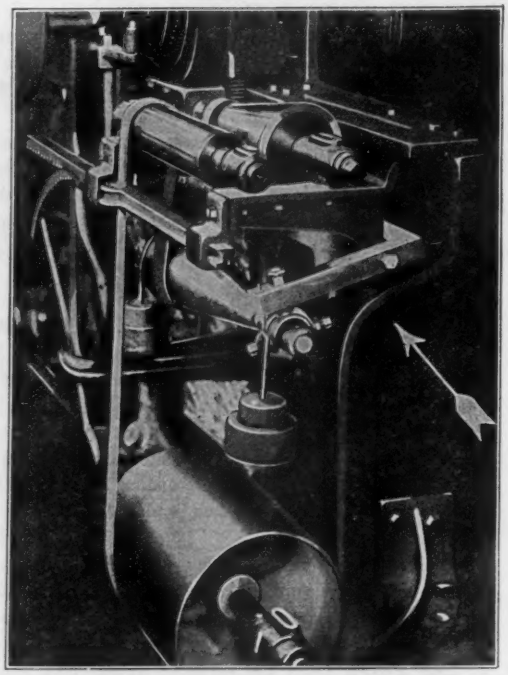

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tooth to occasionally skip, which if it does occur will cause trouble in lengths.

"Fourth, the rollers in the logger-heads may stick up and cause the lap roller to drag which will allow the cotton to wrinkle and pile up, thereby causing the lap to run uneven in length.

"On a picker in proper condition, if proper attention is given to these four points, the variation in the actual length of laps will be negligible. In a southern mill, recently, I had occasion to measure laps from nine Kitson finishers that had been running twenty years. No special preparation was made, we simply took each machine as it doffed and rolled out the lap—and I want to say here that care must be used in unrolling laps for measurement; the proper way being to lay the lap on the floor and unroll it by carefully pushing from you, placing the hands near the top of the lap instead of at the bottom, and walk right down the middle of the lap as it is unrolled. This will eliminate any stretch during the unrolling.

"On the nine machines mentioned, the longest lap was 151 feet and nine inches, while the shortest was 148 feet nine inches, a difference of just three feet. The average length being 150 feet. Three days later the same machines were again measured. This time the longest was 151 feet and the shortest 148 feet eight inches, or a difference of 28 inches. The average length being 149 feet nine inches. These variations are so small that they are practically negligible.

"The gearing on these machines figured an actual length of 142.38 feet, which indicates a natural stretch in the lap of 5.3 per cent, based on theoretical length.

"We next made a lap as hard as it could be run, then on the same machine as soft as possible, and found, on measuring, a difference in length of approximately one per cent, the hard lap of course being the longer.

"The evenness of a lap should be determined by accurately weighing each yard of its entire length, rather than by judging from the net total weight, and the weight should be done on a pair of sensitive balance scales graduated to 1/16 ounces or finer. It is no difficult matter to weigh 45 yards out of a 50-yard lap and the variation should not be over one ounce from the heaviest to the lightest yard. With proper machines, accurately adjusted and operated, and provided the cotton has been properly opened, this can be cut down to ¾ ounce variation or a trifle finer. I have conducted tests where this result was obtained on a two-process picking system. Where intermediates are used there should be no difficulty at all in securing such results.

"To secure good evenness of laps, when only two-process picking is used, it is essential to have a set of eveners applied to the breaker pickers. You cannot get good even results with two processes without having eveners on the breakers.

"With properly prepared breaker lap it should not be necessary to move the regulating screw on the finisher evener but very seldom. The practice of moving this screw as each lap is weighed in order to keep the total weight within a half pound variation up and down from standard, is a great source of uneven work, for it tends to throw the yard by yard weight all out of balance. What is the use of trying to hold the total weight of the lap to a variation of only a half pound, which is only 2½ per cent, when the best we can expect when weighed yard by yard is six to seven per cent variation? It is my honest opinion, based on many tests and years of experience and talking with other mill men, that if a variation of one pound is allowed on either side of standard that much more uniform work will result due to the fact that the regulating screw on the finisher will seldom have to be touched.

"In order to produce finisher laps with a minimum yard by yard variation the following points must be given careful attention:

"First, the throw of the evener belt must be properly set so that no matter whether there is three, four or five laps on the apron, the resulting lap will weigh approximately the same. This is adjusted by moving the fulcrum point of the top lever in or out as the case may be. Second, lapping or creeling the apron should be done 'one by one,' that is, as each finished lap is doffed, a full lap should be laid on the apron. This isn't hard to keep straight if one uses the knock-off on the previous machine and sets them to produce laps weighing approximately the same net total as the finisher laps. Third, feed rolls should be taken out and thoroughly cleaned and the bearings examined at least once each month on each machine. (Some mills do this every two weeks.) At this same time all evener parts must be cleaned and examined to make sure no pedal nor pin is sticking or rubbing. At one mill where I had occasion to make an examination we had to drive some of the evener pedals off with a hammer; they had never had them out, yet the owners wondered why they could not produce even yarn. Fourth, the load on the evener belt must be reduced to a minimum; therefore attention must be given to the apron to see that it is not too tight or its rollers sticking in their bearings."

At the conclusion of his prepared remarks, and in connection with the effect of varying weights of picker laps upon the running of the work, Mr. Towers stated that he had made the following test: Making a careful experiment with drawing sliver from laps which had been held to a maximum variation of one-half a pound, he found an average variation in the finished drawing sliver of seven per cent. Then he took a set of laps and "let them run wild," that is, without a variation standard, and setting back none, and tested the drawing sliver in a similar manner, and the percentage of variation was only five per cent.

In other words, commented Mr. Harvey, "that goes to show that we could tie up the evener belts on our pickers and the work would be just as good."

At this point Mr. Corn called attention to the fact that on the blanks mailed out before the meeting it was requested that reports be made of comparative variation of drawing sliver made from laps allowed a half pound variation; and from laps which were allowed a pound and a half variation. He called for the results of tests on this.

Mr. Campbell reported that over two days—one of which was rainy and cold and the other dry and almost windy—his variation from the last drawing made of laps on which a variation of a half a pound either way had been allowed was three grains per yard. On the other test, allowing one and a half pounds variation, the drawing varied the same amount. He added that on the first day he set back ten laps from six finishers, and set back none the second day, and found that the greatest variation in his laps was one pound, and that was on the second day, during which the

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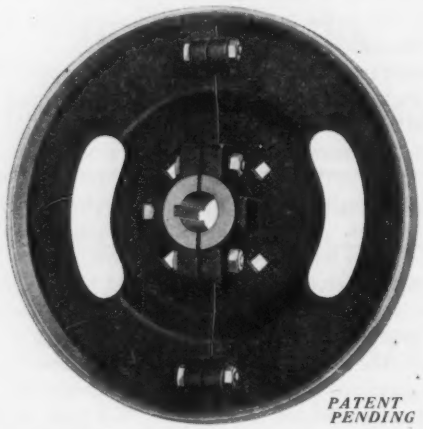

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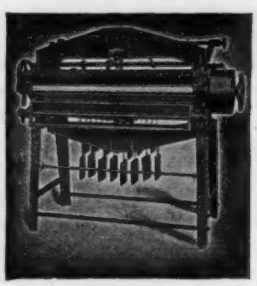

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man did not touch the screw on the finisher, though he did make this adjustment on the first day and the results were the same in the drawing.

Mr. Corn brought out that the intention of the test was to compare the laps with the usual variation standard with those "which you know varied at least one and a half pounds."

The next man reporting was Mr. Townsend, of Erlanger: "From the laps on the first day that varied within one-half a pound each way, my heaviest drawing was 46 grains, and my lightest was 44.5 grains, a variation of 1½ grains. Sizing from the laps which I knew varied 1½ pounds each way, my variation was from 45.5 to 42.5 grains, or three grains total. On the second day from laps varying one-half pound each way, my variation was 1½ grains again, from 46 to 44.5. On the second day sizing from laps that I knew were 1½ pounds off, by actual weight, the sizing was: heaviest, 46 grains; lightest 44.5 grains, or only 1.5 grains variation."

"I am very much interested in what Mr. Towers said about the yard-by-yard variation," stated Mr. Dilling, "and I do believe that sometimes we are truly 'straining at a gnat and swallowing a whale'. Sometimes we think that if we find a three or four yard variation in the length of the lap, we are doing pretty bad, but we do not stop to think that a ¾-ounce variation in a yard is the same percentage of variation as 3 2/3 yards in the entire lap if you are supposed to be making a 54-yard lap. I just wanted to emphasize that statement that we are liable to look too strongly on one feature and not realize the importance of another. What is the actual percentage of variation; that gives us a much better idea of these things than the figures do."

Mr. Jones, in reporting his test, said they made it with the one-half pound variation, which showed a variation of 3.75 per cent. Mr. Chapman said his weighing of the drawing sliver made from laps which he knew varied 1½ pounds from standard showed a drawing sliver variation of 3.6 grains; and that the test on sliver made from the laps held to within one-half pound showed a variation of 3.4 grains.

The chairman read a report that showed a sliver variation of from 54.75 to 54 grains from the laps held to a half pound, on the first day, with no variation the second day; from the laps varying 1½ pounds, the sliver varied from 57 to 56 grains on the first day and about the same on the second. He next asked whether anyone had tested yard for yard the laps that varied 1½ pounds. Mr. Campbell said he did and the test showed an average variation of ¾ of an ounce from lightest to heaviest.

B. F. Huston, of Charlotte, asked of the men making these reports, "I would like to have you gentlemen who have made the tests on the drawing frames with the different weight laps, state whether or not the sliver that was tested was all taken from the same frame." All but one of the men reporting said the tests were made on the same machine, and Mr. Huston, explaining his question, said, "My reason for asking was that some slivers on different machines are not condensed properly."

David Clark explained the reason for requesting these tests of the carders, saying that at the spinning division meetings, variations of from four to ten numbers on the side of a spinning frame were reported, and the spinners said it was not all their fault, and it was desired to determine if possible just what part the card room had in the producing of these wide variations in the yarn numbers.

At this point, the pickers were left and cards taken up, and the chairman put a question asked by Mr. Campbell, as to how long it takes to return to normal weight after stripping the cards. Mr. Touchstone said that several months ago that test was made at his mill, a man being put there for that special purpose, and it was found that it takes very close to four minutes for the work to get back to normal after stripping, four and a half minutes at the outside. This test, it was stated, was made in four different mills. Mr. Touchstone said he cards about 11 pounds an hour making a 48-grain sliver.

Mr. Campbell, who brought up the question, said he is carding 12½ pounds an hour on a 45-inch card, and immediately before stripping he finds that his sliver weighs around 56 grains, and that it weighs about 41½ grains immediately after stripping. Then, after stripping, making tests for every ten minutes, he found that it takes thirty minutes to get it back to its normal weight. Answering Mr. Corn's question, he said that in making the weight "immediately before stripping," he takes the sliver out of the can while the card is being stripped. "Then you'll have your sliver a little heavy," said the chairman. "How's that?" "Well, after the card fills up your sliver will just naturally be heavier," explained Mr. Corn, and then Mr. Campbell asked when he should weigh his sliver to get the proper size. The chairman suggested that he should run the card at least an hour after stripping. "Then it will take an hour to become normal?" asked Mr. Campbell. "No, four minutes," said Mr. Touchstone, and the chairman explained that possibly in four minutes after stripping the sliver will be back on "normal" weight, but that it will take probably an hour's time to overcome the relative variation during the process of stripping and just before and after.

Mr. Robinson, of Camden, lets his sliver run out on the floor for two or three minutes after stripping, he said, in order to eliminate the wide variation from the work. He said it takes about five minutes for his sliver to get back to normal. One thing that will cause variation is to have the web running too tight, he said; he runs his just slack enough to get a nice selvage. He further pointed out that an incorrectly set stripping plate will give trouble.

The chairman requested that, before the next meeting, the men make the following test and report on it there: "Weigh your card sliver after your cards have been running two hours, and get your average, and then begin weighing immediately after stripping and see just how long it takes a card to get back to its average weight. Also weigh just before you strip and see if the card sliver is a little lighter or heavier." He then asked whether anyone had experimented with grinding cards with the doffer running at its normal speed, but no one indicated he had done it.

Smith Crow, overseer of carding, Drayton Mills, Spartanburg, S. C., next spoke in regard to the elimination of variation. "We are trying to cut out variation on cards," he said, "and it is true that the card sliver is lighter for a few minutes after the cards are stripped than just before. I find a very good way to help that is when you strip one card, to cut off the feed on it, and then go to the next card. As soon as one card has been stripped we turn the

feed back on it and let the feed run until the next card is stripped; in other words, we stay one card behind before we put the end up.

"Another way to eliminate unevenness is to not start in at one side of the mill and go straight across with your stripping. Now I do not mean to recommend to strip every other card—it isn't the right thing to do to strip one card and skip one and strip one—but you can keep up with the stripper and know whether he is doing it right at the right time, by stripping one line of cards and then skipping one line; that will help reduce unevenness some.

"There is another thing I would like to have discussed. In my opinion, we get just as much unevenness in our yarn numbers from the laying up of laps as anything else, because it is mighty hard to get a well-trained set of help that will take the pains to lay laps and lay them properly. If you only double the lap one inch in laying a new lap on, you have a double lap that will make a mighty long heavy place in the yarn by the time it is drawn out. I think we as carders should do our very best to educate our help along that line." Mr. Crow added, however, that he did not mean to try to butt the ends of the laps without any lap because that is just as liable to result in a light place, "but don't let them double them over six or eight inches or so, as has been done."

"I remember reading in one of the textile papers that at one of the meetings there was a man who brought up the human factor as being responsible for thick and thin places and variations in the work," said Mr. Miller. "I rather think if we could eliminate deficiencies in the human factor that we would get a long way toward cutting defects out. Of course I know there are some mechanical defects that will always be with us, but the human element is doing more toward making bad running work than anything else that I know of." In this connection, Mr. Miller stated that possibly most of the men in the room, like himself, had come up through the mill by hard work, and that "we had to do our work then and do it right, but in the last few years discipline has been drifting away from us, and if we get in behind the human factor we would get decidedly better results and eliminate many of these things we have been discussing here today."

Somebody suggested, in the light of the report read in the morning of Mr. Ford's plan for cotton mill operation, that he was possibly the man to do this, and Mr. Miller said, "Well, if he will, then we need more Fords in the cotton mill business."

"Got enough of them now," commented one carder. "You just ought to see them parked outside our mill."

There was some discussion on the effect of curled cotton, but it referred to cotton with a natural curl in it, and it was explained that Mr. Towers, who asked the question, had in mind cotton curled by the mechanical operation of the machinery upon it.

In taking up the drawing frame for discussion, the chairman asked, "What is the proper size hole to have in the trumpet for a 50-grain sliver?" This was not answered directly, but John A. McFalls, superintendent, Ranlo Mfg. Company, Gastonia, gave the following general rule for arriving at the size of the trumpet: Multiply the square root of one yard of the sliver being run by 1/64th.

The next subject discussed was the length of the trumpet, and it was pointed out that if the trumpet is longer than the staple being run it will stretch between there and the calender roll and make uneven work.

J. E. Robinson said that for a 50-grain sliver he runs a 3/32-inch trumpet and then up to 55 grains, he uses a ⅛-inch. Mr. Touchstone brought up the question whether anyone had experimented with different length trumpets. He said that some trumpets run nearer the bite of the roll than others. Recently he said he was having trouble, and ordered a longer trumpet and got much better results. He stated that he had not carried the test on through the mill, but so far as the drawing itself was concerned, it looked better and didn't show the weak places. Mr. Miller agreed that he gets decidedly better running work and more even running work the closer he can run the nose of the trumpet to the calender roll.

Mr. Drake brought up the question of flyers: "I would like to ask if anyone has given the flyer question any consideration; whether anyone has tried closing the flyers, and what is the proper opening for a flyer, if there is any set rule to set them, that is the slot you put the end down through; and what results one might expect by closing them." Mr. Campbell said that when he was at the Dwight Manufacturing Company in Alabama, they tried closing the flyers on 12 new jack frames, and the result was that they had to put in a new set of flyers. R. M. Guillet, president of the Dixie Spindle & Flyer Co., Charlotte, was called upon for a statement. He brought out the fact that the presser on the fly frame performs the same function as the traveler on the spinning frame. Ninety-eight per cent of the flyers, he said, were formerly made in England and were hand-made, and that there was a considerable trouble with closing these, but that now flyers were more rapidly being manufactured mechanically. He called attention to the fact that a great many mills have needless trouble and expense by failing to give the proper size presser in ordering, and cited an experience in this connection. He stated that in closing the flyers, the method was to close to the size roving being run, and other gentlemen indicated this was their practice also. Rogers W. Davis said his company has a rule for closing the flyers, but that this is not published in their literature, though he has it on file at his office. Mr. Drake said that recently in making 5 and 6 hank roving, he had closed up his flyers to a No. 7 card gauge and had gotten much better results.

This practically concluded the discussion, and the meeting was adjourned.

Now—reference was made at the beginning of this report to the value of this meeting "in its presentation of subjects for further consideration." There were many topics brought up that should furnish "food for thought" for much experimentation before the next meeting, and it is to be hoped that the men will make these tests and attend the meeting fully prepared to report on them. It is by the cooperation of the men in the various mills in bringing in this information that the best results can be secured from these discussions.

Newport Chemical Works, Inc., recently announced production of Newport direct fast pink E B N which is identical with Erika B N, and Newport direct fast pink EB extra, which is identical with Erika B extra, according to the company.

Since 1865

1911 1912

Pioneers in Knitting Machinery

FOR over half a century, Scott & Williams has been known as the highest standard in knitting machinery the world over.

Year by year S. & W. Knitting Machine design has advanced with the industry, until today S. & W. machinery has all the good points of others plus features exclusive with S. & W.

With factories at both Laconia and Lakeport, New Hampshire, equipped with the most modern machinery, combined with the best modern shop practice and system, knit goods manufacturers are not only assured of perfect equipment for their present needs but continued improvement in design and scope to meet future requirements.

1917

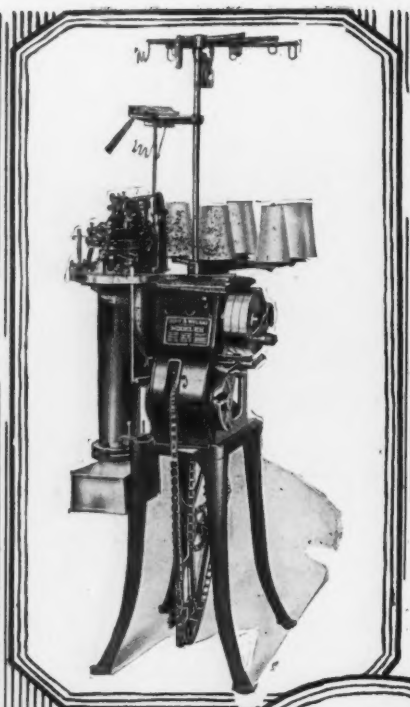
1920

ESTABLISHED — 1865

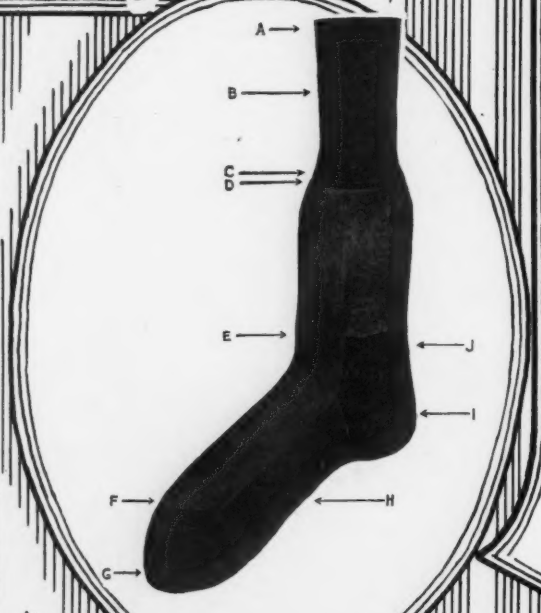
SCOTT & WILLIAMS

366 BROADWAY INCORPORATED NEW YORK

WORKS: LACONIA, N. H.



Model H.H. for Half Hose



New Model H. H.

Producing Ribbed Top Half Hose Complete

THIS machine produces a superior grade of half hose and eliminates the necessity for skilled help. Ribbed top is made on two sets of needles, needles without latches or rivets. Eliminates raveling of waste which occurs when topped by hand. Automatic transfer from ribbed stitch to plain. Each stocking is started automatically on empty needles and dropped from the machine when finished. Machine is fitted with five yarn fingers. Built in all gauges.

Production about 12 stockings per hour on 3¾" 220 needles.

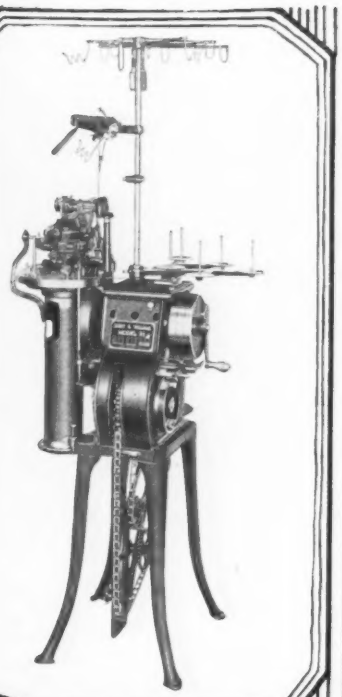
A.—French Welt produced without drawing thread or cutting, consequently no rough edges or loose ends.
B.—Automatic Ribbed Top.
C.—Automatic Transfer.
D.—Ring Top.
E.—Plaiting.
F.—Ring Toe.
G.—Reinforced Toe (yarn change).
H.—Double Sole.
I.—Reinforced Heel (yarn change.
J.—High Spliced Heel.

Established 1865

SCOTT &

366 BROADWAY NEW YORK

Model-R. 1.
for Ladies' and Children's Ribbed Hose



THIS machine is an automatic ribbed hose machine for making Ladies' broad ribbed hose and children's ribbed hose.

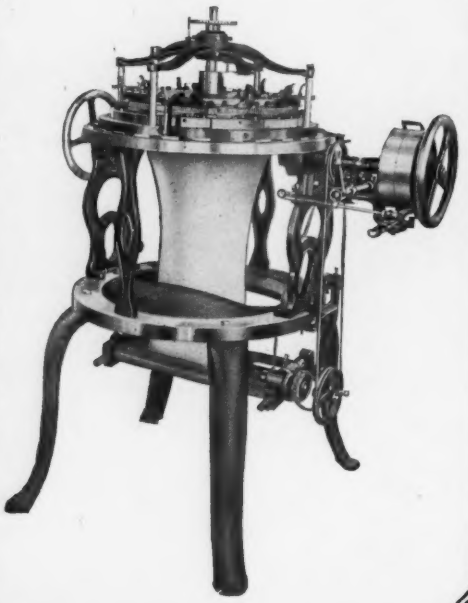
The machine is fitted with regular cylinder and needles, also fitted with a needle dial, using the latchless type of needle. The machine commences the stocking at the toe, knitting with the full complement of needles in the cylinder, the additional dial needles are added for the instep after knitting the looper rounds toe and ring toe, thus producing a ribbed instep. After the heel is knit, a plain high heel can be knit for any desired length and the balance of the dial needles thrown into action, producing a ful rib throughout the leg of the stocking. Each stocking is pressed off when completed.

WILLIAMS Incorporated

HAMILTON, ONT.
Main & McNab Streets

HIGH POINT, N. C.
401 Wachovia Building

Automatic Body Machine



SCOTT & WILLIAMS, Inc., build a full line of Automatic Machines for knitting ribbed fabrics for undergarments.

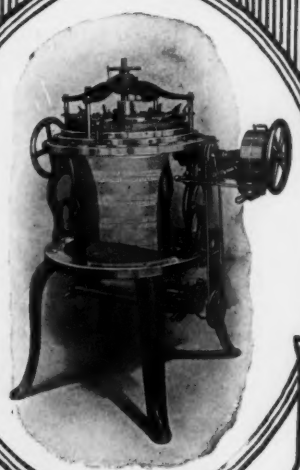
Two machines only are illustrated, one for body fabrics and one for cuffs and drawer bottoms.

Full descriptive catalogue will be sent on request.

ESTABLISHED 1865

SCOTT & WILLIAMS

INCORPORATED



AUTOMATIC RIBBED BORDER MACHINE

ESTABLISHED — 1865

SCOTT & WILLIAMS

INCORPORATED

366 BROADWAY NEW YORK

HIGH POINT, N. C.

UTICA, N. Y.

HAMILTON, ONT.

MONTREAL, P. Q.

The Stop Watch a Necessity in the Knitted Underwear Industry

BY EDWARD HOOVER SHIVE

COST AND PRODUCTION ENGINEER, TAUNTON KNITTING COMPANY, TAUNTON, MASS.

The value of the stop watch is no longer considered confined strictly to common machine shop practice. Its application to many other manufacturing lines (not the least of which is the knitted underwear industry) is of vital importance to all manufacturers who are ever alert for new and praiseworthy methods which make for machine efficiency, low production costs, and complete labor satisfaction—the essential requirements to consistently profitable manufacturing.

Results obtained by the writer during the past eight years of actual employment in a number of underwear mills in different sections of the country proves rather conclusively that there is much need for some consideration of the stop watch in the knitted underwear industry. The only fair and equitable basis for setting piece work rates, or determining the task of an operator is through the proper use of the stop watch.

Piece work rates which are set upon the estimates of foremen or forewomen, or from information gained from other outside mills (though apparently in the same manufacturing class as your own mill) are unsound, absolutely. If I were going to seek like information based purely upon mere estimates, I would much prefer to obtain it from my individual operators themselves. The information would be more nearly correct, and I can state with authority, it would not be quite so dangerous in the final analysis.

Herewith are tabulated the more important reasons for the use of stop watch time study methods in underwear mills:

(1) To set up standard times as a basis for piece work rates, establishing a method sound in principle, understandable by all operators, and eliminating labor disputes arising out of piece rates arrived at after pure guesswork.

(2) To establish equality of piece rates paid on similar machines, and for similar operations.

(3) To standardize working conditions and equipment, and improve methods by an analysis of recorded timings.

EDWARD HOOVER SHIVE.

(4) To relieve department heads of the burden of estimating piece work rate setting, eliminating suggestions of prejudice by the operators, and allowing the overseer to confine his own attention strictly to the management of workers and the quality of product.

(5) To detect unnecessary fatiguing motions of the operator, and through observation aid the operator to earn her wage in the easiest manner.

(6) To detect the inefficiency of machine equipment and tools, or material supplies; also any operations previously incorrectly performed.

(7) To aid in standardizing handling of the product to and from machines or operators, and uncovering faulty management practices.

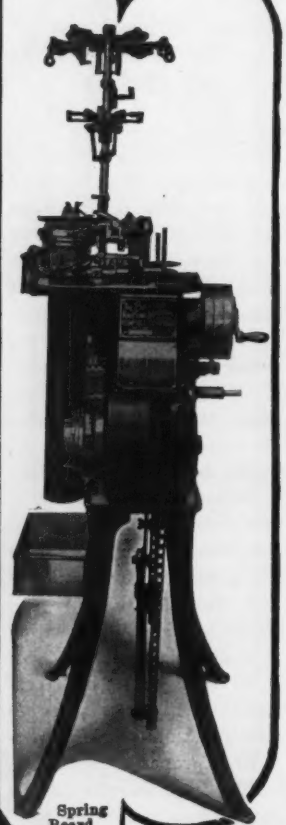
In a knitted underwear mill practically 80 per cent of all direct or productive labor is performed on the piece work basis. We are particularly interested in the sewing machine department, where unless the operating is 100 per cent piece work labor, it is operating upon an inefficient basis. For that reason we shall observe and study entirely the sewing machine department.

Of course many things which could be listed under the caption, "Common Sense," should be done preparatory to the making of time studies, thus putting the house in order. Most important is that of having in your employ a first class A No. 1 sewing machine fixer. My definition of a first class machine fixer is an individual who is capable of having all sewing machines under his supervision properly operating, and is able to put in the greater part of his time reading newspapers or trade journals. The time thus spent is certainly spent in the right direction. We know all machines are O. K. by only looking at the machine fixer.

Machinery operating at too great a speed is apt to cause loss of production in a measure greater than that of too little speed, not to forget the wear and tear on the machine and equipment. However, each individual type of machine has its appointed speed, and a good machine

The Banner

Full Automatic Hosiery Machines



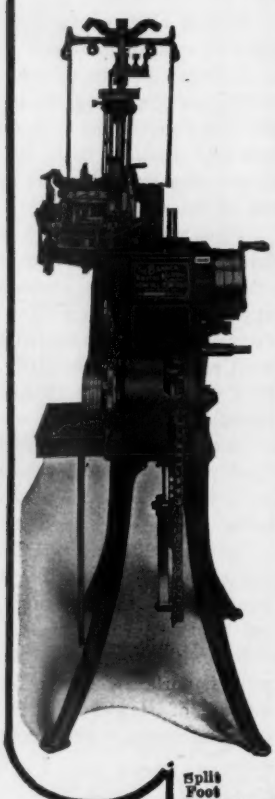
Spring Beard Needle Machine

Simplicity
Quality
Speed
Production

All Parts Accessible from the Front of Machine

We have just placed on the Market two new models– The Spring Beard Needle, built in sizes of 3" to 3 3-4" diameter, and a new model –Split Foot Machine, built in sizes of 3 1-4" and 3 1-2" diameter.

Write for descriptive catalog



Split Foot Machine

HEMPHILL COMPANY

MAIN OFFICE AND FACTORY PAWTUCKET RHODE ISLAND

TRADE MARK

SOUTHERN OFFICE and SHOW ROOMS
912 James Bldg.
CHATTANOOGA, TENN.

PHILADELPHIA OFFICE and SHOW ROOMS
208-9-10 COLONIAL TRUST BLDG.
PHILADELPHIA, PA.

fixer will have all types of machines running at the proper revolutions per minute.

There are also other arrangements which may be done to allow the operators to give their best efforts, rather than the offering to them of handicaps. Proper layout of machine tables through the department, and proper spacing or distancing of the machines themselves upon the tables. Proper chairs or stools; proper lighting, both natural and artificial. Best method of tying bundles, using a patented tie-up cord so handling of shears will be eliminated, and opening and closing of bundle operations reduced to a minimum. Arranging to have the bundles of garments delivered to the operator, and taken away again when finished, thus saving operator and machine time.

Of course, time studies may be made without the putting of the house in order, but the result would show up the foolish things too glaringly, and the time studies could not be made with any degree of accuracy; that is, with any fond hopes of regulating the piece work rates, or to arrive at production per machine operation, for the simple reason that the several similar machines possibly would be running at different revolutions per minute. Also certain operators would be nearer the source of unfinished garments and would pick out small garment sizes, while other operators, being further away, would spend much time away from their machines, and would naturally get only the large sized garments. Certainly studies made under such uneven conditions could not be used in setting up of standard times for operations though identical in nature and produced upon a like type of machines.

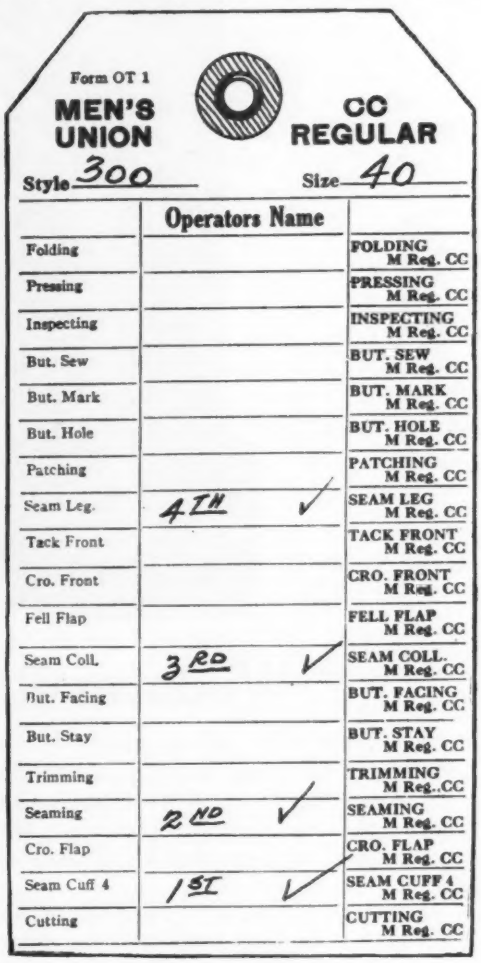
I have in mind a recent experience in a well known knit underwear mill. It happened that I was called there to make an investigation after this manufacturer had received current piece work rates as paid by other mills in other localities, but the garments produced and the operations performed being practically the same as in his own factory.

He considered he was paying entirely too much. He especially was interested in the piece prices of one mill in a list of which he handed to me, and the inside conditions of which particular mill I very thoroughly understood. The facts were that in this mill the total paid for all piece work labor was 42 per cent less than was being paid by his mill. At first, my employer stormed and said the information he had received was not true. He pointed out to me that it could not be for the simple reason that he employed a good superintendent who had been with him a long time. He was a hard plugger, never even took a vacation, and he was practically the first man on the job every morning, kept the weekly production reports personally, and he knew just what was going on in his mill every minute in every department.

I explained to him that the mill which gave out the information was extremely up-to-date in its production methods, and that I did not doubt but that the data as given him was correct. I, however, persuaded him to start with the investigation, explaining that at the completion I would render a report, outlining the steps, which, to my mind, should be taken to decrease the fatigue of the workers, thereby increasing their efficiency, and thus increase the total output of production. Afterward, through time study methods, set up new time standards for the several operations. I would then prove to all operators that even at a lower piece work rate they would be enabled to earn greater weekly wages with the installation of better operating methods.

The investigation was finished in three weeks, and a rough summary of the report read about as follows:

Mill well located, beautiful open workrooms, fine daylight from many large windows, but very poor artificial lighting from small bulbs high in the ceiling made working impossible the last hour of a winter day. The machine table arrangement was most terrible. Of nine tables only two were of one length, two others were thirty-six feet and forty-five feet respectively, and six tables were install-


Form OT 1

MEN'S UNION

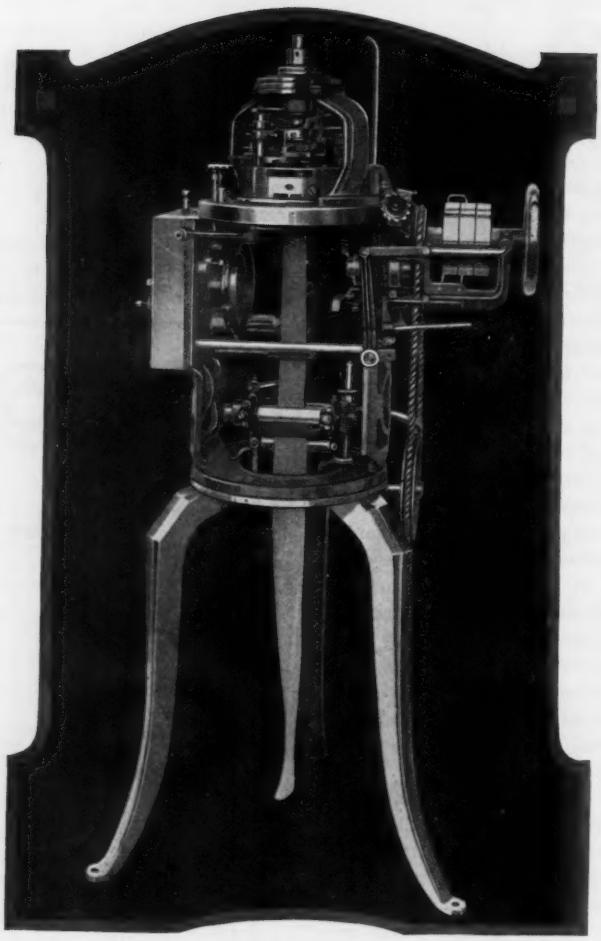
CC REGULAR

Style 300 Size 40

	Operators Name		
Folding			FOLDING M Reg. CC
Pressing			PRESSING M Reg. CC
Inspecting			INSPECTING M Reg. CC
But. Sew			BUT. SEW M Reg. CC
But. Mark			BUT. MARK M Reg. CC
But. Hole			BUT. HOLE M Reg. CC
Patching			PATCHING M Reg. CC
Seam Leg.	4TH	✓	SEAM LEG M Reg. CC
Tack Front			TACK FRONT M Reg. CC
Cro. Front			CRO. FRONT M Reg. CC
Fell Flap			FELL FLAP M Reg. CC
Seam Coll.	3RD	✓	SEAM COLL. M Reg. CC
But. Facing			BUT. FACING M Reg. CC
But. Stay			BUT. STAY M Reg. CC
Trimming			TRIMMING M Reg. CC
Seaming	2ND	✓	SEAMING M Reg. CC
Cro. Flap			CRO. FLAP M Reg. CC
Seam Cuff 4	1ST	✓	SEAM CUFF 4 M Reg. CC
Cutting			CUTTING M Reg. CC

THE PIECE WORK TAG.

ed crosswise while the other three stood lengthwise to the room. The driving mechanism for these tables was by overhead shafting and dirty belts. There were no straight aisles, and there being no scheduling of production or method of apportioning work to the machine operator, it was necessary that an operator leave her machine and jay walk to a large packing case (and there were more than one hundred of these packing cases in the room, and bundles of garments in many cases piled higher than a person's hands if held over his head). On her way to and from her machine she usually encountered another operator either coming or going. I observed, in many instances, operators working on the far side of the forty-five foot table were



Wildman Ribbing Machine

Look at the illustration of a Wildman Circular Ribber. Note the rigid construction of the frame. An inspection of the actual machine will produce even a greater impression of strength.

See a Wildman Ribber in operation at your first opportunity. An illustration cannot show you the accurate parts, moving with perfect mechanical precision, that produce fine and smooth fabric for the knitting industry.

We are always pleased to demonstrate a Wildman Ribber.

On request we will send the "Wildman Ribber Catalogue" giving detailed illustrations and descriptions of every important part of the machine.

We have just issued a very complete and informat ive book, "The Science of Knitting"—Price $3.00

TRADE MFG MARK

WILDMAN MFG. CO.

NORRISTOWN, PA.

OPERATION TIME STUDY SHEET

Study Number 29 Time Taken 10 30 A.M. Date 8/25/1922

Machine Used WILLCOX AND GIBBS Machine Number 37 Rev. per Minute 2800

Operator Name BESSIE D Operator Number 102 ~~Day or~~ Piece Work 30¢ Rate Per Dozen

Department Name FINISHING - SEWING Department Number 8 Type Material HEAVY COTTON

Give Detailed Description of the Operation FIRST SEAMING - SEWING ALL SEAMS OF SIZE 40 MEN'S UNION SUIT, EXCEPT UP BOTH LEGS AND ACROSS THE FACING AT THE CROTCH. THIS CONSTITUTES WITH WASTE CHAIN ABOUT 200 LINEAL INCHES OF SEWING TO EACH GARMENT

PERF NO.	PERFORMANCE NAME	PERFORMANCE TIMES (in Seconds) INDIVIDUAL GARMENTS												Total Time For 1 Dozen Garments
1	PICK UP BUNDLE (12) GARMENTS													6
2	OPEN BUNDLE - CLIP OPERATION CHECK													12
3	LAY OUT GARMENTS AND PARTS													14
4	BRING GARMENT TO NEEDLE	2	2	1½	2	2	2	1½	2	2	2½	2	1½	23
5	SEWING OPERATION (POWER ON)	×149	○143	119	□135	+152	117	118	119	125	−138	120	=137	1572
6	PUT SEWN GARMENT ASIDE	1½	1½	1½	2	2½	1½	2	2	2	2½	2	2	23
7	ARRANGE SEWN GARMENTS													9
8	TIE UP FINISHED BUNDLE													12
9	PLACE FINISHED BUNDLE IN TRUCK													4
10														
11														
12	REFERENCE MARKS PERFORMANCE No. 5 SEWING OPERATION													
13	× FAULT OF OPERATOR - RIPPING SEAM LOST 29 SECONDS													
14	○ KNOT IN 70/3 THREAD									"	26	"		
15	□										19	"		
16	+									"	18	"	AND 21 SEC.	
17	−										27	"		
18	=										22	"		
19														
20														

Actual Total Seconds Consumed 1675

Allowance 20 % for Total Various Idleness Plus 335

Total Seconds Considered in Setting Piece Work Rate 2010

Mill Operating 48 Hours Per Week or 172,800 Total Seconds Per Week

172,800 Total Seconds Per Week Divided by 2010 Seconds Equal Production of 86 Dozens Per Week

Production of 86 Dozens Per Week at 30¢ Piece Rate Per Dozen Equals Total Piece Work Earnings $25.80

State Remarks Below or Use Other Side of This Sheet

BESSIE D IS A VERY EXPERIENCED FLAT LOCK OPERATOR, FAST, CAREFUL AND INTERESTED IN HER WORK

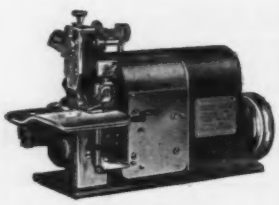
THE 70/3 THREAD IS RATHER BRITTLE AND TOO MANY LARGE KNOTS. SUPERINTENDENT NOTIFIED.

forced to walk thirty-five feet to and thirty-five feet from their machines, not only to get product, but also to deliver the garments after they had machined them. There were several operations where the operator spent as much time getting and returning the product as it actually required her to do the sewing operation.

The product of the mill was men's and boys' union suits, and a small amount of two piece shirts and drawers. The shirts and drawers requiring fewer operations and several entirely different operations than were required on union suits was a severe handicap to the union suit production, which was the bulk of the business, and as a consequence, the machines which were used alike for union suits and shirt and drawers were kept busy while operators who did not sew on shirts and drawers were idle a part of each day for want of product.

The piece work prices were set at hit or miss, and later turned out to be bad guesses at the best. For instance, the

MERROWING



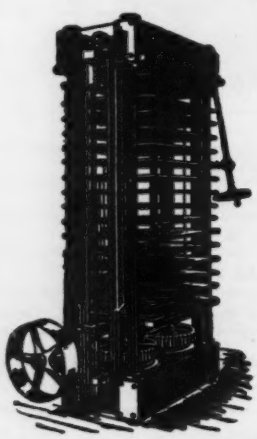
MERROW
Reg. Trade Mark.

The Merrow High Speed Overseaming Overedging and Shell Stitch Machines.

MERROWISE FOR EFFICIENCY

IT MEANS: MAXIMUM PRODUCTION
MINIMUM EXPENSE
UNEXCELLED QUALITY OF WORK

THE MERROW MACHINE COMPANY
ESTABLISHED 1838
16 LAUREL ST., HARTFORD, CONN., U. S. A.



RELIANCE
Hot Plate Screw Press
FOR
Hosiery and Underwear
Write for Catalog and Prices
Reliance Machine Works
FRANKFORD, PHILA.

JOSEPH T. PEARSON & SONS CO.
MANUFACTURERS OF
BONE DRY
HOSIERY FINISHING BOARDS
THAT WORK ABSOLUTELY SMOOTH
PROMPT SERVICE—RIGHT PRICES
1815 E. Boston Avenue, Philadelphia

GENERAL MACHINE WORKS
YORK, PA.
Manufacturers of
Circular Rib Knitting Machinery
Cylinders and Dials

OPERATION TIME STUDY SHEET

Study Number 30 Time Taken 1 30 PM Date 8/25/1922

Machine Used WILLCOX AND GIBBS Machine Number 24 Rev. per Minute 2780

Operator Name ELLA S Operator Number 131 ~~Day or~~ Piece Work 10¢ Rate Per Dozen

Department Name FINISHING-SEWING Department Number 8 Type Material HEAVY COTTON

Give Detailed Description of the Operation SECOND AND FINAL SEAMING - SEWING SEAMS UP BOTH LEGS AND ACROSS THE FACING AT THE CROTCH THIS CONSTITUTES WITH WASTE CHAIN ABOUT 65 LINEAL INCHES OF SEWING TO EACH GARMENT.

PERF NO.	PERFORMANCE NAME	PERFORMANCE TIMES (in Seconds) INDIVIDUAL GARMENTS											Total Time For 1 Dozen Garments
1	PICK UP BUNDLE (12) GARMENTS												5
2	OPEN BUNDLE CLIP OPERATION CHECK												10
3	LAY OUT GARMENTS												9
4	BRING GARMENT TO NEEDLE	2½	2½	2	2½	2½	2½	3	2	2½	2½	2½	30
5	SEWING OPERATION-POWER ON	44	42	42	41	38	40	39	43	42	43	44	41	499
6	PUT SEWN GARMENT ASIDE	1½	1½	1½	2	2	1½	1½	1½	1½	2	2	1½	20
7	ARRANGE SEWN GARMENTS													9
8	TIE UP FINISHED BUNDLE													12
9	PLACE FINISHED BUNDLE IN TRUCK													4
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

Actual Total Seconds Consumed 598

Allowance 20 % for Total Various Idleness Plus 120

Total Seconds Considered in Setting Piece Work Rate 718

Mill Operating 48 Hours Per Week or 172.800 Total Seconds Per Week

172.800 Total Seconds Per Week Divided by 718 Seconds Equal Production of 240 Dozens Per Week

Production of 240 Dozens Per Week at 10¢ Piece Rate Per Dozen Equals Total Piece Work Earnings 24 00

State Remarks Below or Use Other Side of This Sheet

ELLA S. IS AN EXPERIENCED FLAT LOCK OPERATOR
SLOW, BUT CAREFUL AND EXTREMELY STEADY. I TALKED TO HER ABOUT FASTER
MOVEMENTS DURING THE SEWING OPERATION AND SHE MAY INCREASE HER OUTPUT
TO 250 DOZENS PER WEEK. THE THREADS RUN EXCEPTIONALLY FINE ON THIS MACHINE

button stay and facing operations were being done by two girls who were long in the employ and considered faithful servants, but who were working less than 60 per cent efficient, and seriously affecting the output (of not alone their operation, but the following one) of the trimming operator who was being forced to wait repeatedly for her work. The piece work rate paid on the button stay and facing operations was five cents per dozen, and during a time study many false and loafing motions were observed. The operation time study sheet was then explained to these operators, and it was also explained to them that the piece work rate had not been properly set. It was too high, and that after a production system had been installed they were to be paid less per operation, but would be required to sew more than had been their usual day's work of 72 dozen. A short while after the piece work rate was properly set at 3¾ cents per dozen, these same operators then turned out a production of 120 dozen garments daily, thereby increas-

OPERATION TIME STUDY SHEET

Study Number 34 Time Taken 8 30 A.M. Date 8/26/1922

Machine Used WILLCOX AND GIBBS Machine Number 32 Rev. per Minute 2750

Operator Name BLANCHE E. Operator Number 91 ~~Day or~~ Piece Work Rate 08¢ Per Dozen

Department Name FINISHING - SEWING Department Number 8 Type Material HEAVY COTTON

Give Detailed Description of the Operation SEWING SEAMS OF 2 SLEEVE CUFFS TO LONG SLEEVES AND 2 ANKLE CUFFS TO LEGS SIZE 40 MENS UNION SUIT- THIS CONSTITUTES WITH WASTE CHAIN ABOUT 47 LINEAL INCHES OF SEWING TO EACH GARMENT

PERF NO.	PERFORMANCE NAME	PERFORMANCE TIMES (in Seconds) INDIVIDUAL GARMENTS												Total Time For 1 Dozen Garments
1	PICK UP BUNDLE (12) GARMENTS													3
2	OPEN BUNDLE-CLIP OPERATION CHECK													9
3	LAY OUT GARMENTS AND PARTS													13
4	OPEN BUNDLE SLEEVE-CUFFS (2A)													2
5	LAY OUT SLEEVES AND CUFFS													3
6	CUFF AND SLEEVE UP TO MACHINE	3½	3½	3½	3½	3½	4	3½	4	4	3½	4	4	45
7	SEWING OPERATION-(POWER ON)	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	54
8	SECOND CUFF AND SLEEVE TO MACHINE	4	3½	3½	4	3½	3½	3½	3½	3	3½	3½	3½	42
9	SEWING OPERATION (POWER ON)	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	54
10	CUT SLEEVES APART													7
11	PUT SEWN SLEEVES ASIDE													3
12	OPEN BUNDLE LEG CUFFS (2A)													2
13	LAY OUT LEGS AND CUFFS													4
14	CUFF AND LEG UP TO MACHINE	4½	3½	3	3½	3½	3½	3½	4	3½	3½	3½	3½	43
15	SEWING OPERATION-(POWER ON)	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	54
16	SECOND CUFF AND LEG UP TO MACHINE	4	4	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	43
17	SEWING OPERATION-(POWER ON)	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	4½	54
18	CUT LEGS APART													9
19	ARRANGE- PUT BUNDLE TOGETHER													11
20	TIE UP BUNDLE AND PUT ASIDE													4

Actual Total Seconds Consumed 459

Allowance 20 % for Total Various Idleness Plus 92

Total Seconds Considered in Setting Piece Work Rate 551

Mill Operating 48 Hours Per Week or 172,800 Total Seconds Per Week

172,800 Total Seconds Per Week Divided by 551 Seconds Equal Production of 313 Dozens Per Week

Production of 313 Dozens Per Week at 08¢ Piece Rate Per Dozen Equals Total Piece Work Earnings $25.04

State Remarks Below or Use Other Side of This Sheet

BLANCHE E HANDLES BUNDLES AND PARTS EFFICIENTLY RUNS MACHINE A TRIFLE TOO LONG, CAUSING WASTE OF THREAD IN EXCESS CHAIN SHE WILL IMPROVE

OBSERVE THERE IS NO BREAKING OF THREAD ON THIS SHORT OPERATION THE STITCH IS LOOSER AND TENSION PERFECT MACHINE FIXER PLEASED TO LEARN OF THIS FACT

ing their daily earnings to $4.50, and being entirely satisfied.

Contrast now the picture made during the time of investigation with one of less than six months later where detailed elementary time studies are taken as a basis for the operation of the entire mill.

A lighting expert gave his services gratis, and his recommendations were carried out, and now the artificial lighting is as good as the day light, and the last hour of the day in winter time is not lost, but has been made very valuable to both the employee and employer alike.

During a shut-down of the mill of only six days, including Saturday, Sunday, and one holiday, the various odd lengths of tables were sawed into twelve tables of one exact length, each sixteen feet (not more than fifty feet of new lumber being purchased). These tables were set crosswise in a room forty-eight feet wide, six tables on each side of the room, with a sixteen-foot aisle in the center. The

Perfect Quality In Cotton Yarns

THE QUISSETT MILL was erected in 1910, going into production in 1911, and is one of the most up-to-date equipped plants in the cotton industry North or South.

Located in New Bedford, the center of high quality fine cotton goods and yarns, the Quissett has never had an unsuccessful quarter or an unprofitable year since it went into operation.

The chief reason for the success of fine cotton manufacturing in New Bedford is its location on salt water and the natural humidity necessary for high quality cotton manufacturing, a wonderful climate, a wonderful city and satisfied help (highest paid in the country). It is the best located cotton manufacturing center in the United States.

Following an extremely careful selection of the highest quality cottons, the next necessary condition for high quality yarn production is thorough preparatory processes.

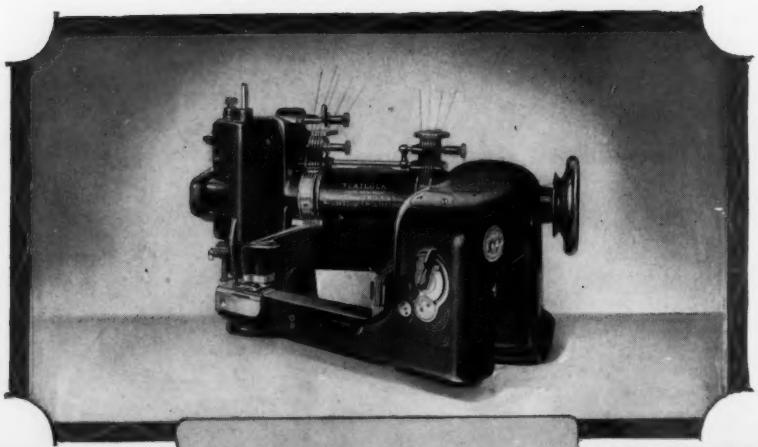
The Quissett Mill operates 80,000 producing spindles and 30,000 twister spindles. We do not believe that there is a fine cotton yarn mill in the world where so much preparatory machinery is employed. And thorough preparation is necessary for clean, perfect quality—the only kind of yarn that we are interested in—and the kind you get when you specify Quissett Quality Yarns.

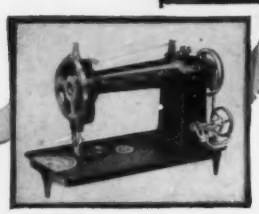
Quissett Mill

New Bedford, Mass.

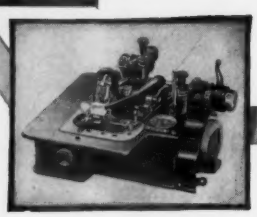
Wm. M. Butler, President, Edward H. Cook, Treasurer, Thos. F. Glennon, Agent

QUISSETT MEANS QUALITY





A machine of maximum production for seaming and hemming all kinds of men's and women's wear.



For seaming, overedging, hemming, clocking and ornamenting men's and women's wear.

For *ALL* Knit Underwear Seaming

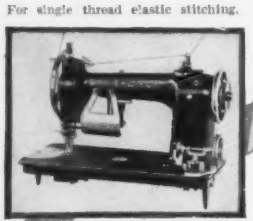
Everyone in the trade knows the successful performance of the Flatlock Machine. It is a high-class workman. It has proved its value on all lines of knit underwear.

Today, after ten years of world-wide use, the work of the Flatlock still stands head and shoulders over that of any other machine. It owes its continued dominance to the flatness of its seam—a flatness that has not yet been equalled.

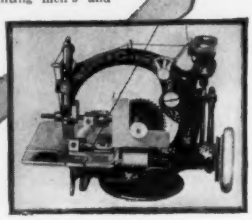
At a speed of 45 to 50 interweaving stitches a second the Flatlock locks together the *abutting* edges of the garment in a strong, elastic, non-ripping, non-ravelling seam.

Flatlock seamed garments are more attractive in appearance. Of more importance is the lasting satisfaction of garment wearers who obtain seam comfort and seam security.

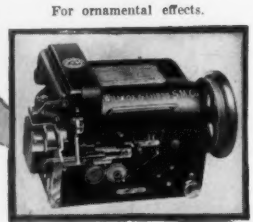
For single thread elastic stitching.



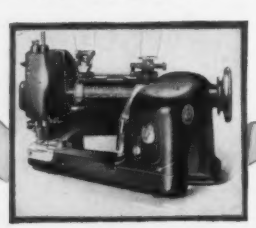
For ornamental effects.



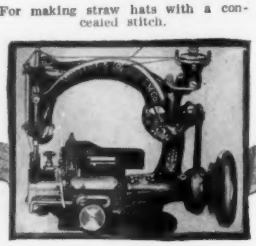
For ornamental effects.



For making straw hats with a concealed stitch.



For making two and three needle single or double lap seam fell on shirts underwear and other garments.



For making women's hats, millinery, etc.

WILLCOX & GIBBS SEWING MACHINE CO.

WILLCOX & GIBBS S. M. CO. LTD.,
20 Fore Street, London, E. C. 2

Home Office: 658 Broadway

New York, N. Y.

Canadian Representative:
W. J. Westaway Co., LTD.,
Main and McNab Streets, Hamilton
McGill Building, Montreal

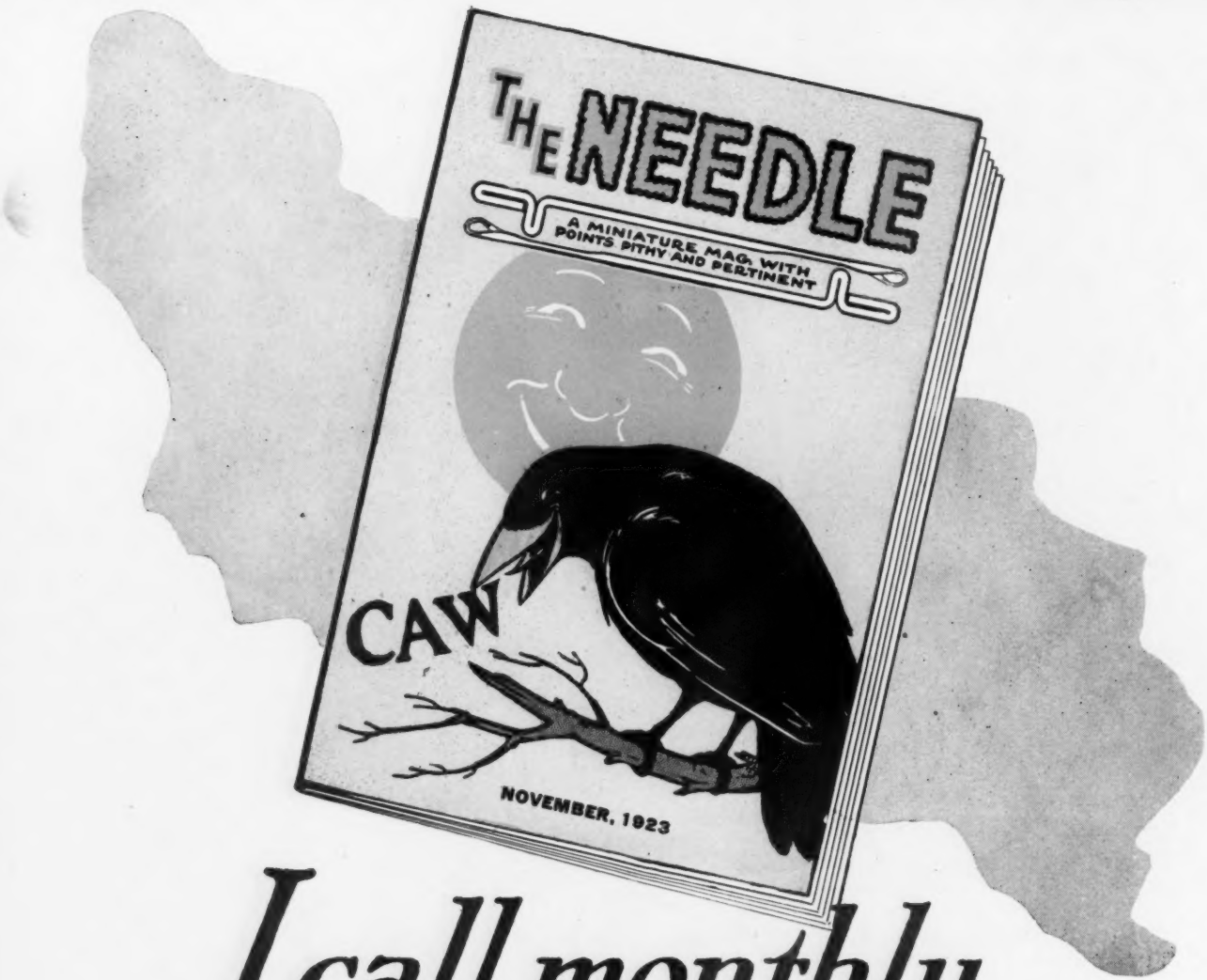
FRANKLIN Needles were the pioneers in Latch Needles. In 1868 in Franklin, New Hampshire, Townsend perfected the "tumbler" or latch needle, and since that time Franklin master needle workmen reared in a latch-needle atmosphere have become "bred-in-the-bone" needle-makers of rare knowledge and experience.

Franklin Latch Needles, with their correctly designed head, perfectly turned hook, accurately shaped cheek, solidly riveted and freely moving latch, are smooth as velvet and absolutely uniform in every minute particular.

Franklin Needles are today upholding the reputation of many leading knit-goods manufacturers by helping to produce higher quality goods with less "seconds" and in less time.

It pays to fill the machine with Franklins —the pioneer latch needles

FRANKLIN NEEDLE COMPANY
Established 1874
FRANKLIN, N. H.



I call monthly

"I am a little magazine and my name is 'The Needle.' I call once each month on the knitting mill friends of my company. I cost nothing because my company sends me free of charge to those sending their name and address. My policies and politics are sweetly elastic. I am moral or nothing—frequently both. You will find me exciting without being sensational, inspiring without being didactic, and as strong a Mental Martini as they can make me without exceeding the speed limits of the Eighteenth Amendment. I hope that it will be as much a pleasure for you to receive me as it is for me to call each month. If you haven't sent your name and address, please do it now, for I want to call on you. Remember I don't cost you anything, so send in your name to my boss."

Chauncey A. Williams,
MANCHESTER NEW HAMPSHIRE

THE CAW BRAND
MADE IN U.S.A. BY U.S.A. LABOR

Knitting Needles

OPERATION TIME STUDY SHEET

Study Number 35 Time Taken 11 A.M Date 8/26/1922

Machine Used WILLCOX AND GIBBS Machine Number 28 Rev. per Minute 2785

Operator Name ANNIE C Operator Number 73 ~~Day or~~ Piece Work 06½ Rate Per Dozen

Department Name FINISHING - SEWING Department Number 8 Type Material HEAVY COTTON

Give Detailed Description of the Operation SEWING SEAM OF COLLAR TO GARMENT - SIZE 40 MEN'S UNION SUIT THIS CONSTITUTES WITH WASTE CHAIN ABOUT LINEAL INCHES OF SEWING

PERF. NO.	PERFORMANCE NAME	PERFORMANCE TIMES (in Seconds) INDIVIDUAL GARMENTS												Total Time for 1 Dozen Garments
1	PICK UP BUNDLE (12 GARMENTS)													3
2	REMOVE COLLARS FROM BUNDLE													9
3	BRING GARMENT UP TO MACHINE	2½	2	2½	2	2	2	2½	2	2	2	2	2½	26
4	BRING COLLARETTE UP TO MACHINE	4	3½	3½	3½	4	4	3½	3½	3½	3½	3½	3½	44
5	ARRANGE GARMENT AND COLLARETTE	5½	6	6½	6	5½	5½	5½	6½	6	5½	5½	5½	70
6	SEWING OPERATION (POWER ON)	21	21	21	21	21	21	21	21	21	21	21	21	252
7	FINISHED GARMENT ASIDE	1	1	1	1	1	1	1	1	1	1	1	1	12
8	CLIP OPERATION CHECK													3
9	PUT BUNDLE IN TRUCK													2
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

Actual Total Seconds Consumed 421

Allowance 20 % for Total Various Idleness Plus 84

Total Seconds Considered in Setting Piece Work Rate 505

Mill Operating 48 Hours Per Week or 172.800 Total Seconds Per Week

172.800 Total Seconds Per Week Divided by 505 Seconds Equal Production of 342 Dozens Per Week

Production of 342 Dozens Per Week at 06½ Piece Rate Per Dozen Equals Total Piece Work Earnings # 22.23

State Remarks Below or Use Other Side of This Sheet

ANNIE C. IS A VERY CLEVER OPERATOR. SHE DOES NOT UNTIE THE BUNDLE. SIMPLY SLIPS DOWN TIE CORD WHEN REMOVING COLLARS. LOSES LITTLE TIME DURING 2ND 3RD AND 4TH OPERATIONS, BUT WILL IMPROVE POSSIBLY PRODUCING OVER 350 DOZENS - THE THREAD DID NOT BREAK.

shafting pulleys and overhead belting was all torn down. The tables motor driven from below by two motors placed on either side of the room, and directly in the center space between three tables driving direct to the nearest tables, and these tables in turn driving the next two tables. The motors and belting are entirely boxed in. Therefore, no danger, no dirt, and a very efficient drive, for all tables are running at one speed only, and the individual machines driven at the proper speed by a correct size pulley on the table shaft.

The machines were placed at a distance of forty inches from center to center of machine. This allowed four machines to a side, or eight machines to each table, and plenty of room for careful operation. The saving of time operators spent in talking to each other was considerable. This single item of eliminating talking among the girls

through distancing of the machines immediately increased the production from each machine. Likewise it increased pay in the operator's envelope. This was noticeable to us, but apparently more so to the workers.

I knew that if the desired production efficiency was to be reached that ultimately it would be necessary to rid the room of the large rough packing cases which were being used as storage bins for the garments between the machine operations. While the re-arrangement of the machine tables made it much easier and the distance shorter for the operator to take and deposit her bundle of garments, I considered her leaving the machine as time wasted, and the time study of an operation which I was to observe was to include only the time consumed from picking up the bundles and opening them to closing them and laying them to one side, and this time should be spent entirely at the machine table. To this end fiber trucks were purchased to replace the large wooden cases.

There were installed 250 fibre boxes (on wheels) all of one size, sixteen inches wide, thirty-two inches long, and twenty-seven inches high, and practically one hundred unsightly, rough wooden cases were removed from the sewing department to the shipping room where they served a better purpose, and at the same time reduced the cost of the fibre trucks exactly $1.00 each. These trucks hold from five to eight bundles of garments (one dozen to each bundle) according to style and size of garments. The trucks are durable, clean, sightly, and being very light they can be pushed when filled with little exertion.

The operator need not rise from her chair or leave her machine unless it is of her own desire, for all trucks containing garments she is to work on are pushed to her machine, and are pushed away again after she has sewn them. This is done by a woman who is in direct charge of the movement of the trucks. The trucks are numbered from 1 to 249, and accordingly each truck of work is scheduled from the cutting operation to the last operation, that of folding. All machines are laid out in the sequence of the operations (19 distinct operations) as shown on the piece work tag reproduced herewith. Therefore, trucks travel only in one way and there is no interference.

The house now in order, an entire month was taken up in making time studies of each and every one of the 19 operations required to finish a union suit. The idea was first explained and thoroughly sold to the operators, who, I am pleased to say, were most intelligent, offering the best aid possible to bring about accuracy, and while studies were being made, and after data was completed the operators again were made conversant with the facts—truth. From the detailed information practically every piece work price was changed, some reduced, some increased, but every rate was absolutely set in accordance with the length of time it showed by time study was required to perform the individual operation.

The rates were in every operator's good judgment set in a fair and square manner. They agree that only stop watch methods could have brought this measure of satisfaction about. There was no talk, no trouble. These prices have never been changed, though from one year to another the adding or subtracting a percentage to or from the pay envelope of all workers alike has been necessary according to changeable living conditions.

This mill had tried, without success, for many years to produce up to and excel five hundred dozen of garments per week. Within two years after the suggestion of the stop watch method they were able to produce with the addition of few machines and no extra floor space whatever a production of eight hundred dozen of garments weekly, and if sales made it necessary, then one thousand dozen of garments could be produced practically every week.

You will note on the piece work tag I have checked the four important flat lock seaming operations: First, seaming cuffs; second, general seaming; third, seaming of the collar; fourth, seaming of the legs. These several operations are those which are herewith produced in detail. The facsimile operation Time Study Sheets show the studies as actually made in this mill represented in this story. Time studies were made on the entire nineteen different operations as listed on the produced piece work tag.

(EDITOR'S NOTE: Mr. Shive will gladly answer any question pertaining to stop watch time study methods, or questions regarding knitted underwear cost and production control in general, through the pages of COTTON. We also will mail you, upon request, a blank copy of Mr. Shive's own idea of an operation Time Study Sheet to be used as the sample for your printer.)

"Departmental and Standard Costs," by William S. Kemp, treasurer, Holtzer-Cabot Electric Company, recently issued by the National Association of Cost Accountants, of which Mr. Kemp is vice-president, should prove a valuable contribution to cost accounting literature, in that it is a simple explanation of the actual operation of a modern, practical cost system by a man who has been closely associated with its installation and operation over a term of years. There are about a hundred pages in the book, including 36 charts and forms of the actual entries illustrating the entire cost system of the Holtzer-Cabot Electric Company from the erection of the plant to the completion of the finished product. The value of any work of this kind is in its applicability to other types of industry, and this volume is abundant with adaptable suggestions and ideas. Copies may be secured by non-members from the National Association of Cost Accountants, 130 West 42nd St., New York City, at the price of $4.00 per copy.

Following their established practice of the past several years, Link-Belt Company of Chicago has again issued a calendar for the ensuing year. In general style the 1924 calendar adheres closely to those issued in the past. Sixteen by twenty-four inches in size, each of the twelve sheets contains not only a large monthly calendar, plainly and legibly printed, but also, in smaller size, the months preceding and following.

The illustrations, however, show a marked improvement over the calendars of previous years. They are from the justly celebrated Chicago artist, Jeffery Grant, and while they accurately portray the construction features of the various types of Link-Belt equipment shown, they have an artistic touch unusual to mechanical subjects.

A true harbinger of Spring is the gala array of colors on the Spring 1924 Season Color Card now being released to the trade by the Textile Color Card Association.

Progress in Mechanical Counting Devices

BY J. T. CHIDSEY *

Quintus, the Roman historian, said, "For my own part I am persuaded that everything advances by an unchangeable law through the eternal constitution and association of latent causes, which have been long before predestinated."

I am not so sure that Quintus was right in his predestination theory, but he was undoubtedly right in believing that progress is the result of the constitution and association of latent causes. This possible potentiality is brought into an active state by thought and study on the part of individuals working alone or collectively and the result is inventions and improvements in machines and methods, which, when applied, denote progress.

The textile industry has been second to none in its application of the many mechanical inventions and improvements brought out. It's a far cry to the hand looms and spinning frames of our great-grandmothers. Many of us are in danger of thinking, however, that this age of improvement reached its zenith a generation ago, or at least discontinued its advance. But stop a moment! Is this so? We are so close to the present and become so quickly accustomed to each new improvement that we fail to realize there has been more progress in many of these lines in the past fifteen or twenty years than in the previous fifty years, or, so far as we now know, fifty centuries.

The present extended use of automatic counting machines in the textile industry had its start only about fifteen years ago. It began with one or two of those pioneering souls found in every industry, who are not satisfied with the present, but have vision and open mind and discrimination to study, investigate, to choose the good and useful in what is new, and reject the unimportant. How much the world owes to these pioneers in all realms!

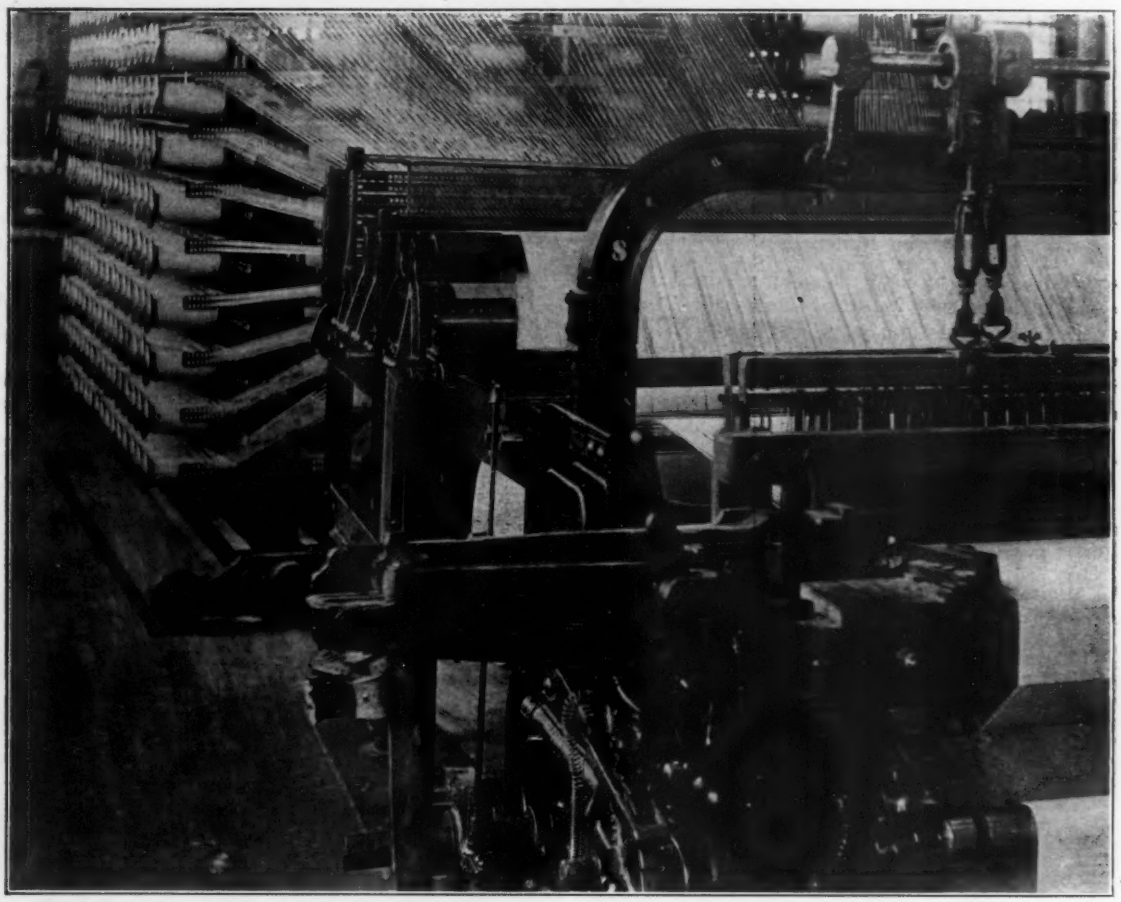


FIG. 1. A PICK COUNTER ON A TIRE FABRIC LOOM.

The paying for operations on a piece-work basis, the saving in handling of materials and the checking of efficiency of individual machines by the counting mechanism registering the amount produced at the machines, instead of weighing, measuring or counting at some distant point, are among the important functions of counting devices at the present time. This speeds up operations, lessens cost of production, avoids disputes as to wages or output, weeds out or calls attention to inefficient machines or operators, and gives the manager a feeling of security in his knowledge of these factors that he cannot otherwise have.

The company with which the writer is connected was

* President, The Root Company.

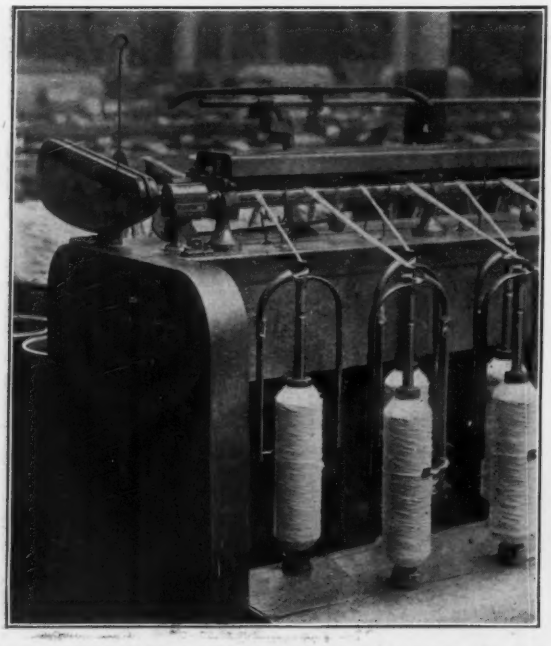


FIG. 2 SHOWS A HANK COUNTER IN THE SAME TIRE FABRIC PLANT.

among the leaders in this work, and in looking back now it seems as if its most important service has been to the textile industry. Fifteen years ago, there were very few textile installations, but many of the leading men in the industry were beginning to realize the need of some better method of registering production operations. Among them were Charles H. Fish, then of Dover, N. H.; Frederick H. Bishop, of the Universal Winding Company, Boston; J. C. Wadleigh, agent, and B. P. Currier, buyer, of the Merrimack Manufacturing Company, Lowell, Mass.; the Jenckes Spinning Company, Pawtucket, R. I.; the American Mills Company, Waterbury, Conn.; and others.

For a number of years as much or more time and expense was put into investigating the needs and possibilities of the trade and the engineering of counting equipment applications as into the selling, using constantly the suggestions offered and the encouragement given by these men. If we have succeeded in some degree in our effort to be of service, the industry owes much to these textile men who cooperated so practically with our engineers in making effective our ideas and in meeting textile requirements as they have arisen.

Probably the most important of these developments has been the application of counters to looms for registering "picks," permitting paying weavers by the "pick," which is now recognized as the most equitable, economical and mutually satisfactory way of paying.

Besides a very great general advantage in the use of pick counters, the necessity for increased production in tire fabric and other lines during the war period and since, requiring day and night shifts, sometimes for long periods, developed a special need for pick counters as the most satisfactory basis for paying the two shifts.

Next in importance to the pick counters are counters or clocks to register hanks produced on twisting, spinning, roving, and drawing frames.

In finishing plants there are many uses equally essential. The close association and frequent conferences of

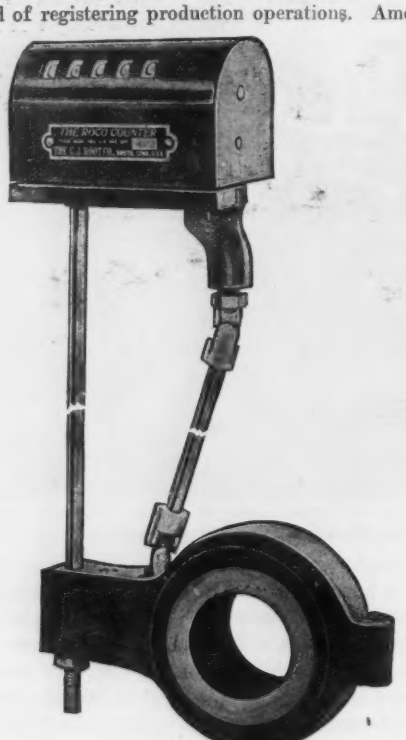


FIG. 3 IS A SEPARATE VIEW OF THE PICK COUNTER AND CONNECTION AS USED ON THE LOOM SHOWN IN FIG. 1.

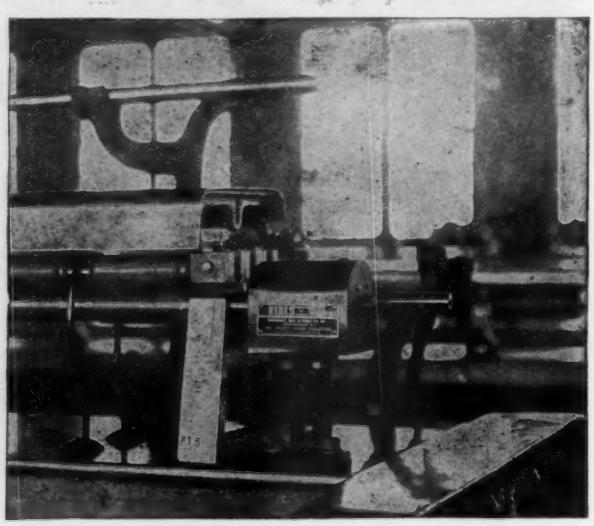


FIG. 4 SHOWS AN ENLARGED VIEW OF THE HANK COUNTER. THIS PARTICULAR COUNTER IS STANDARD EQUIPMENT ON THE ROVING FRAMES BUILT BY THE WOONSOCKET MACHINE & PRESS CO. OF WOONSOCKET, R. I.

textile men have been an important factor in spreading the information, and many men have set about investigating those counters a brother superintendent was using. It doesn't take long nowadays to prove to a progressive textile man the desirability of a proposition of this kind. Production costs are too insistent to allow overlooking any

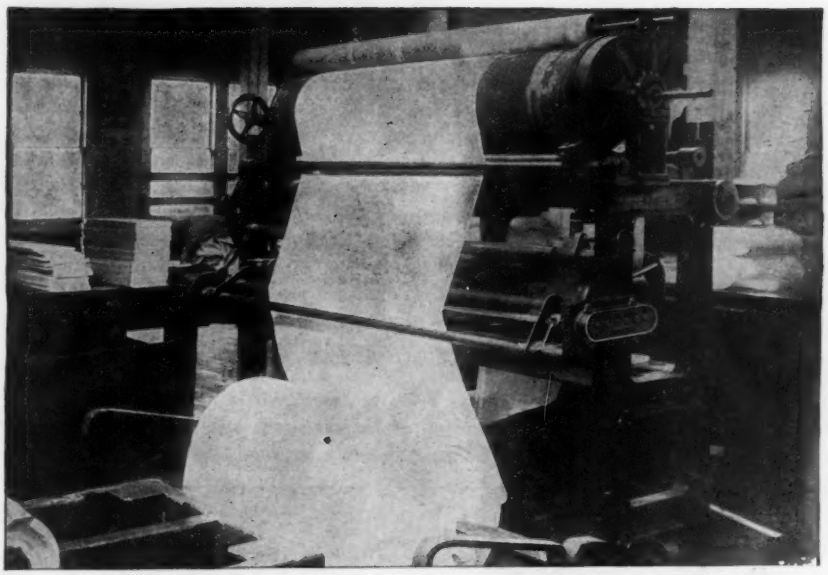


FIG. 5. SHOWS A STANDARD COUNTER ON A DOUBLING MACHINE AT THE FARWELL BLEACHERY, LAWRENCE, MASS.

important factor in their control and reduction.

Figure 1 shows a "pick" counter on a loom of a well-known tire manufacturer, counting every cross thread of the long fiber Arizona cotton which makes the foundation of a world famous cord tire. This type of "pick" counter is adaptable for weaving mills for use on all kinds of material, from the heaviest blankets to the finest broad silks.

Perhaps some examples of actual practice will prove interesting to illustrate the practicability of the mechanical counter.

A few months ago a duck manufacturer was talking about an experience of his with pick counters. He said, "Some time ago we equipped 100 of our looms with pick counters. We are running a day shift and a night shift in the weave room, and our method of paying the weavers was to take the production of both shifts for the week and determine the wages to be paid the workers of each shift by dividing the total by two.

"Our weave room records show that since we have installed the pick counters, our production of cloth has actually been increased almost eight per cent over the production we were formerly getting.

"There are several causes to which this increase in production might be attributed: On one hand, there is the fact that the ability to watch his production and to realize that more production on his part will mean more money for himself is an incentive to the weaver. Then on the day shift, with the looms operating during the noon hour, as formerly, the weaver will give more attention to them than he did before. And where he formerly watched certain looms in order to get a five- or six-cut roll off in order to get the production on that week's record, he now works by the day and endeavors to get off every yard he can. This method also keeps the production records of the weavers on each shift separately."

In a mill making blankets, prior to the use of pick counters, it was impossible for the superintendent to get out his payroll until several days after the end of the week. After a complete installation of counters, he is able to check up the production of each operator every night and at the end of the week, make up his payroll almost immediately. This also proves valuable in case a man quits in the middle of a pay period or at sometime when a roll of blankets is half finished.

Another textile man, manufacturing a very high grade of elastic webbing, says that the use of pick counters eliminates a great deal of hand measuring, which, needless to say, represents considerable labor. It also obviates the temptation of the weaver to run his rubbers slack and thus

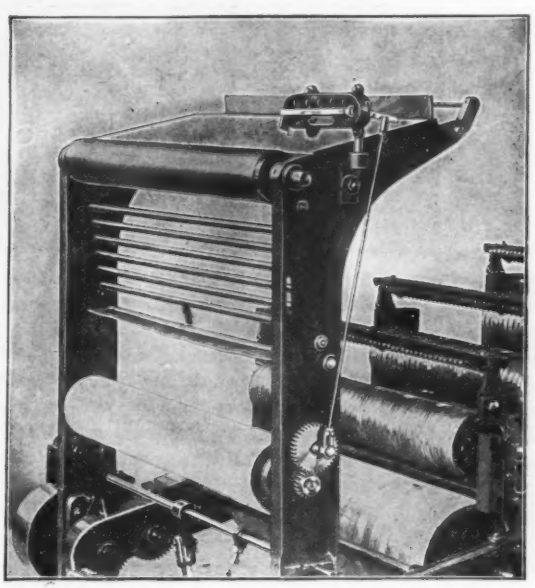


FIG. 6 IS A STANDARD COUNTER WHICH SHOWS PARTICULARLY THE METHOD OF GEARING ON A COMPRESSING AND INSPECTING SPOOLER.

make second quality merchandise in order to increase his yardage and wages. In addition to being more accurate than hand measuring of elastics, it gives a clean cut record of the weavers' production, and without any great amount of labor in ascertaining same, and last of all, he finds that it actually increases the production. This is partly because they get an early tally of any trouble with the slippage of friction plates or belts or whatever may cause

slow speed, and second, because there is the psychological element which is paramount. A weaver is not satisfied to see his production drop many hours in succession. He has a record for which he strives daily and when he sets out for this goal, he is apt to accomplish his purpose.

A mill manufacturing tire fabric exclusively, and operating night and day is able to run continuously without the necessity of weaving in a mark or making a cut in the cloth to determine where the day weaver stopped and the night weaver started. Readings of the pick counter are taken and the work goes continuously along. This absolutely avoids the almost uniform controversy between the workmen.

Another manufacturer making a high grade mohair cloth tells us that he keeps track of his production much more accurately than he could by any other method.

A manufacturer of textile machinery uses counters for pick counters. A hurry order was put through for more pick counters so that these men could go back to work.

In hosiery manufacturing a mill is using a counter to keep track of the number of pairs of hose turned on the suction turning tubes. This is an absolutely tamper-proof machine in every way and although it is new, it appears to be proving successful.

A man making athletic goods advises that he is able to keep track of the number of shirts made on his knitting machines and this is most important because he occasionally has calls for dozens or practically any fraction of dozens. The use of counters enables him to prevent overruns and the accompanying additional waste.

In another instance a maker of wire cloth uses pick counters on his wire looms and is able to keep track of his production as he was never able to keep track of it before. This is the only instance I know of where counters have been applied satisfactorily to wire looms.

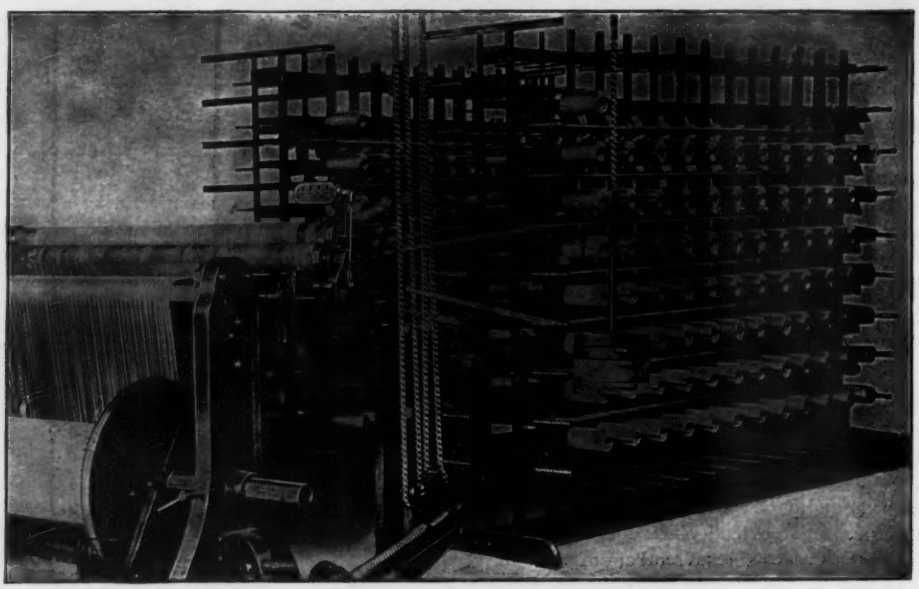


FIG. 7 SHOWS THIS SAME COUNTER ON A DIRECT BEAMING OUTFIT MADE BY THE WARP COMPRESSING CO. WORCESTER. THIS COUNTER IS PART OF THEIR STANDARD EQUIPMENT.

winding up thread. He is able to set the counter at the number of yards wanted and when zero is reached by the counter operating backward rather than forward, the machine is automatically stopped by the counter. This is, perhaps, one of the best instances of a counter being used as a labor saving device, wherein it is more accurate than a human being.

Still another mill making narrow elastic says that in using the pick counter on all of their weaving looms, they have obtained a very accurate check on the production of each individual machine, and by changing their method of piece work, so that wages are determined by picks rather than by yards, they have simplified their payroll immensely. They have also found that by varying the wage rate based on production indicated by the pick counters, they have been able to materially increase the production per machine. An incident related in this connection may be interesting. A number of workers, during the busy times of 1919, refused to work because the looms upon which their particular work was to be done were not equipped with

Other actual experiences with hank counters in yarn spinning are related on pages 523-4-5 of the May, 1923, number of COTTON in the report of the spinning division of the Southern Textile Association.

In the limited space allowed an article of this character it is impossible to do more than hit the high spots, and only a few of them. But while you are reading this, or during your day's work, mechanical counters are counting practically everything you eat, wear, or use, personally, or in or about your residence, your car, your office or your factory. Whether counting potatoes up in Aroostook County, Maine; bananas in the Bahamas; oysters in Baltimore; macaroni in New Orleans; canned salmon in Alaska; packages of Quaker Oats or Shredded Wheat; collars and cuffs in Troy; cigar wrappers in Pennsylvania; the mechanical counter is your willing employee, paid a price so small you never know it, and entirely contended with its pay—no strikes, no shirking, no loafing.

Reducing Seconds on Silk Hose.

EDITOR COTTON:

We are running tram and art silk hose, and I will outline in this letter the system we use to reduce seconds due to lines and rough needle streaks in the finished goods usually caused by rough rivets.

In the first place, we have each machine numbered, and have a tag for each machine, which is fastened to the stockings produced by it. Each morning, a girl gets the stockings from the machines, puts the tag on them and gets them looped. We have an electric stove, and while the stockings are being looped the girl puts water and olive oil to boil on the stove, and when the stockings are looped, the girl puts them in the boiling solution and lets them boil for one hour to get all the gum out of them. She then rinses them out in cold water, wrings them out and boards them. She then examines the stockings for needle streaks or bad sinker marks, and as the tag is attached, she knows which machine caused the trouble, and the difficulty is remedied promptly.

This system has reduced our percentage of seconds in the finished goods, due to defective needles, to almost nothing. One dozen stockings will pay for all expenses, and in this way we save many a dozen. At the present price of silk, this should be a good system for any mill on this class of work. K. Y. N. (Pa.)

A Kink on Machine Cleaning.

EDITOR COTTON:

In the September number of COTTON, I was interested in the suggestion of "O. T. (Pa.)" for knitting mill managers. I want to give you a kink in cleaning knitting machines we use in our mills in the hope of helping other knitting mill managers.

Formerly each operator cleaned his own machine. The time allotted for this work was the last half hour on Saturday morning. From this cause alone our idle machinery hours was a big figure. Our kink is this: We have a force of cleaners, three or four men, who travel from one machine to another and one mill to another—we have three mills all within the distance of 120 miles. These men spend approximately an hour on each machine. Due to the thoroughness with which they clean the machines it is only necessary to clean them once in every two months.

One hour idle on each machine in every eight weeks represents a considerable saving over one-half hour idle every week on every machine. J. D. R. (Mass.)

We invite our readers to make use of this department for the discussion of any and all problems arising in connection with the knitting mill from the office to the packing and shipping departments. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. All questions will be answered as promptly as possible. The names and addresses of the contributors must be given, but will be held in confidence and a pen name substituted when printed. All accepted contributions other than questions will be paid for after publication. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

What Causes "Thinning" in the Heel and Toe?

EDITOR COTTON:

I wish some of the readers of your "Knitting Kinks" department would explain a difficulty I am having with a machine thinning off in the heel and toe, and I would be pleased to have them give a few suggestions for remedying the trouble. R. T. Y. (Pa.)

EDITOR COTTON:

Replying to "R. T. Y.," I would suggest that he look at the springs on the take-up. A weak spring will cause the trouble he is having, or a rough place on the throat plate, or roughness in the fingers, or the porcelain guides may be cracked or nicked, and again, sealing wax or glue used to hold these guides or eyelets sometimes gets onto where the yarn runs through and will cause this trouble. A rough rivet on the needle, bent latches, split needles or sinkers bent on the nose, or a rough sinker, are other things which might cause it, as can rough places on the bobbin or cone. Old Knitter (Pa.)

What Goes Into Your Waste Bag?

EDITOR COTTON:

How many superintendents and managers of hosiery mills actually know what goes into the waste bags? During a recent conversation with a waste dealer he told me that it was not unusual to receive a bagful of perfect hosiery ready for the dyehouse. That gave me an idea. I had a few bags of hosiery waste ready for shipment, that would have been invoiced at about $150. Instead of shipping them I had the bags opened and an experienced mender was instructed to sort out and mend all stockings that she thought could be reclaimed. Some needed looping, some seaming, and others something else. The mended waste was then sorted into two sizes, 8½ and 9, and 9½ and 10, and

then dyed black. After being paired we found that a big percentage would be seconds that were sold in the regular way. Those below grade for seconds were sold to the employees in bundles. Instead of $150 we received $750 for this hosiery, and while there was of course the additional expense caused by finishing this waste, we considered it well worth while.

In any mill where knitters, inspectors, etc., are allowed to pass final judgment as to what is waste, there will be a wide range of opinion, and if the waste is sorted by an experienced mender, a paying amount of stockings will be salvaged.

I now have all the waste inspected before it is taken to the bags. J. D. T. (Canada)

The Yarn Market

The cotton yarn market in Philadelphia which took an upward ride with the raw staple on its price rise during latter November retained the same sensitive relation with its unspun brother when December arrived, and yielding to the influence of a downward fluctuation in cotton, yarn prices went down under pressure. This effect was first felt in carded numbers, later to be reflected in the combed yarns and then in the yarns for weaving purposes. While this reduction was more or less general and thorough, with perhaps dealers sacrificing more than the spinners, the general price level did not go down to that published here last month by a margin of one or two cents.

This fluctuation in sympathy with raw cotton demonstrated the incentive which has been dominant in determining cotton yarn rates; it showed that the yarns could vary in relation with the whims of the raw staple market, but that this influence from cotton, while bringing either a stimulus or a depressent to yarns with regard to price, did not affect in any way the amount of demand from yarn consumers. Furthermore, it was evident that it was price, rather than the percentage of demand and purchase, which was regulating the rate level of the yarns.

Patently such a condition does not make for stability or confidence in the market, and varying explanations for the buyers' attitude were extant. Business was being done, and in many cases buyers reported themselves pleased with the transactions, though their nature was different from the ordinary character, in that sellers were serving a larger number of customers in considerably smaller volume, the amount of business placed for future delivery being in the minimum. In spite of what seemed an unprecedented Christmas business over the counters, it was pointed out that retailers were doing their buying in exceedingly small volume, that this affected the consumers of yarn and that this was in turn reflected back into this market. With this day-to-day purchasing existing in the retail and wholesale channels it was but natural, yarn consumers explained to salesmen, that they must perforce adopt a similar course.

In searching for some fundamental basis for the lack of interest on the part of buyers, and considering the condition in the market as described, it seemed to be logical that the thing most desired by the buyer was not especially a lower level of rates so much as a stable market in cotton. The staple, subject to a multiplicity of influences on its own price, and fluctuating easily upon some report, founded or unfounded, has not done anything toward creating a stability of feeling or confidence. It is seen that this instability has expressed itself in yarns as well. Furthermore, an unstable cotton market creates a feeling of watching and waiting, which might prevail in spite of what seems to be a more grounded basis in outlet channels. It was explained that something must be done to preclude sudden and drastic changes in the basic commodity before the attitude of uneasiness and the natural inclination to hold off would be noticeably overcome. Stable cotton at a higher price, they pointed out, was much safer than a lower priced staple subject to violent fluctuations which create disorder in all divisions of the industry and uncertainty rules.

Quotations for the Philadelphia market on December 16 follow:

Single Skeins.

4s to 8s	49	10s	50
12s	50½	14s	51½
16s	52½	20s	54½
24s	56	26s	58
30s	60		

Single Warps.

8s	50	10s	50½
12s	51	14s	52
16s	53½	20s	55
26s	60	30s	61
40s	70		

Carpet and Upholstery Yarn in Skeins.

8s and 9s 3-4 slack	51
8 3-4 tinged tubes	46 @47
8 3-4 hard white twist	48 @49
8 3-4 hard twist waste	46 @47

Two-Ply Skeins.

8s	49	10s	50
12s	51	14s	52
16s	53	20s	55
24s	57 @58	26s	59
30s	60 @61	40s	69

Southern Two-Ply Warps.

8s	51	10s	52
12s	53	14s	54
16s	55	20s	56
24s	58½	26s	60
30s	62 @63	40s	70 @71

Frame Spun Carded Yarn on Cones.

8s	50	10s	50½
12s	51	14s	51½
16s	52	18s	53
20s	54	22s	55 @56
24s	57	26s	58
30s	61 @62	40s	70
30s double carded	62 @63	30s tying-in	59

Two-Ply Combed Peeler Skeins and Warps.

8s to 16s	65 @67½	20s	67½ @70
24s	70 @73	30s	75
40s	82½	50s	87 @90
60s	97 @1.00	70s	$1.10
80s	$1.20@$1.25		

Mule Spun Carded Yarn on Cones.

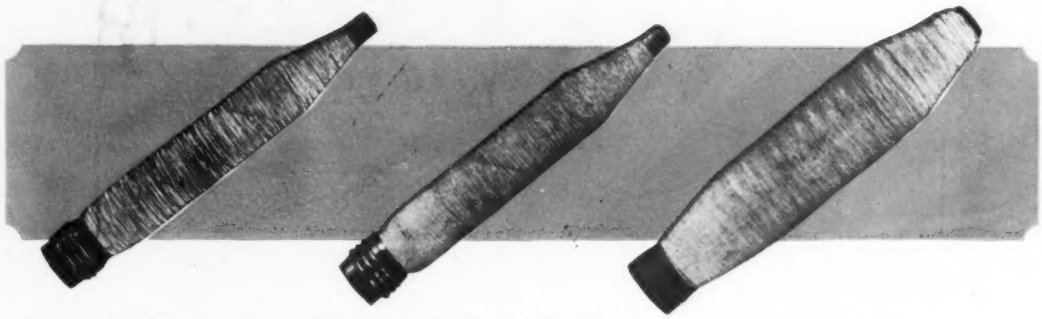
10s	52	12s	52½
14s	53	16s	53½
18s	54	20s	55
24s	57	26s	59
30s	63	40s	73

Mule Spun Combed Peeler Yarn on Cones.

10s	58	12s	59
14s	60	16s	62
18s	63	20s	64
22s	65	26s	70
28s	71	30s	73
36s	75	38s	80
40s	82		

National Aniline & Chemical Company have issued their booklet, "Dyers' Formulas," for 1924, which contains recipes prepared by the dye application laboratories of the company for matching the shades shown in the 1924 spring season shade card of the Textile Color Card Association of the United States, Inc. The recipes are for dyeing upon silk, cotton, wool and leather.

Don't spin filling to fit a Hole in a Piece of Wood



Spun with 1¾" Ring for Shuttle.

This Universal wound bobbin contains the amount of filing spun with 2" ring. It has been inspected and perfected to reduce costs and protect values in weaving.

Spun with 2" Ring for Winding.

Spin to Spinning Limitations Rather than to Shuttle Capacity

Spin Warp and Filling Yarns with same size ring, warp bobbin filling built. Gain flexibility of spinning equipment and save doffing time and labor costs.

With a large spun supply labor cost of filling preparation is cut in half, therefore why not treat the filling as fairly as you treat the warp, save filling waste, increase loom efficiency, reduce cost of weaving per cut, make jobs more attractive to operatives and improve qualities for resultant savings in cloth department?

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The Knit Goods Market

Primary market trading in cotton knit goods remained in a state of suspense until the close of 1923, after several months of dealer resistance to prices in an effort to halt the flight of values in raw materials markets. In some respects the distributors waged a campaign that to a great extent served their purpose as well as if they had forced cotton down as much as it advanced, for there was not a time in the last six months of the year when they were not able to buy staple goods as low as when cotton was at the bottom of the year. It was a phenomenally successful unorganized movement.

Either manufacturers of staple hosiery had bought liberally of low price yarn or the market was overstocked with each of a few lines as common in drygoods and notion stores and haberdasheries as screws and nails are in a hardware store. The situation as to supplies of yarns or finished goods as relates to hosiery may be illustrated by an incident in a mill weaving ratine, once a novelty cloth, last year as salable as any staple. The lowest price quoted to a northern manufacturer for ratine yarn was precisely another manufacturer's selling price for the finished cloth packed ready for shipment. The northern manufacturer, in other words, could have bought from a mill, located elsewhere, a pound of the cloth at exactly the cost of a pound of the yarn at the time it was offered.

Knit goods mills at all times were able to get better than yarn cost out of their product, but if any sold at replacement, he was the one exception, and when combed yarn for misses' ribs was held by spinners for 64 cents, sales of the ribs were being made at, in several instances, five cents a dozen less than when yarn was bought at 50 cents and less.

Misses' fine gauge ribs opened in August at $1.75, and jobbers did some buying, but not enough to satisfy impatient interests, and quotations became variable and remained so throughout a great part of last month, when a sale of a mill lot was reported made at $1.70. Jobbers seized this as a cue for an attack on legitimate prices and for a time were stubbornly resisting the quotations of four to five months before. But toward the end of the year low price yarn supplies were pretty well exhausted and the bulk of the burdensome stocks of ribbed goods had been moved out, so that mills still having a little yarn bought in July and August showed some firmness in still quoting the opening price. The ribs should have been selling last month, if at all, at not less than $1.85. A North Carolina manufacturer was adhering to $1.80.

Combed ribs seem to have been bought last year more heavily, relatively, than almost any other hosiery line, notwithstanding the fancy top derby and drop stitch ribs in seven-eighths length were contracted for on a liberal basis. The misses' fancies carrying the crochet stitch as the ornamentation of the top were a special favorite, and some of the larger jobbers placed large repeat orders in December, although having but a few weeks before supplied details for their initial orders.

Prices were not advanced, the rise in yarn being totally ignored by a number of mills. There was confidence in the new patterns at the outstart, and the manufacturers with exclusive designs seem to have covered for their yarn requirements to the end of the season. Last year was productive of some new records for transactions in misses' fine gauge and turnover top ribs.

From the standpoint of volume of sales, coarse ribs also had a bumper season, but prices were inadequate. A southern manufacturer last month withdrew his price of $1.12½ a dozen, after selling but little at that figure, and came out with a new price of $1.15, rise 7½ cents, fall five. A large operator in coarse ribs was asked to quote on a substantial lot on the basis of five cents rise, and declined to name a price, taking the stand that large sizes would show practically no margin on a rise of less than 7½ cents. One of the leading New York commission houses was adhering to $1.15 while a smaller establishment was quoting but $1.10, 7½ cents rise.

An early Fall quotation on boys three-pound ribs was $2.05 a dozen on size 8, ten cents rise. By the latter part of December a low quotation was $2.17½, rise ten cents, One mill priced the line at $2.13½ on sevens, and named 12½ cents as the rise, and lost an order in competition with the mill quoting on eight and calling for a rise of ten cents. The price variance in relation to heavy cotton hosiery was a source of no little confusion, and suggested the desirability of a conference of manufacturers for establishing something like uniformity.

Failure of mills to focus their ideas of values was apparent in low end cotton half hose. There was some semblance of agreement in relation to 176-needle socks, a common quotation being $1.15. Probably the largest manufacturer of this class of half hose named $1.17½, subject to terms, leaving the line on the $1.15 basis. The 176-needle lines had been pretty well sold up for Spring at around $1.07½ to $1.10 a dozen. Women's carded 176-needle goods are variously quoted, $1.07½ being a late price mentioned by one large mill specializing in this class of stocking.

Most of the mills making ladies' mercerized hosiery have a big opening for more business. The low to moderate priced numbers, quiet for some time, have been especially weak recently. At a low price of $2.50 a dozen, 220-needle goods were hard to move in worthwhile quantity. A leading primary market hosiery seller states as a fact that a mercerized stocking which now is quoted at $2.50 was sold to jobbers at $2.65 on a 22-25 cent cotton market and earlier at $2.75, when cotton was around 18-20 cents. "I suppose," he said, ironically, "that when cotton hits 40 cents we will be selling this stocking at about $2.25."

An obstacle to substantial selling of 220-needle mercerized, it is thought by some factors, is the fact a good combed stocking is available at $1.85, affording distributors opportunity for a wider margin than the one time popular mercerized of the coarser gauge. The latter is regarded hardly a stopping place as between combed and fine gauge mercerized and fiber and tram goods.

A Central West mill making a range of cotton stockings sold more high class mercerized last year than of either combed or carded, and shipments were larger than in 1922. The stocking is shaped, claiming parity with full fashioned. A Philadelphia manufacturer of an especially well knitted and finished line of 240-needle mercerized

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carrying an appealing luster also had better than the average business. Prices of the 240-needle range from $3.25 to $3.50 a dozen and meet with less resistance than $2.50 for the standard 220 needle.

Jobbers accord good value to a ladies' combed at $1.85, and some put it in the class of next year's strong sellers in low price lines for women. One representative house recently put in a substantial order, reasoning the stocking was priced so low that it was assured a profitable turnover even in the event of cotton slipping by eight to ten cents. This house takes the rational view that cotton hosiery bought at prices available last month would be a sure winner for any investor, and he foresaw a general rise in all cotton hosiery lines, low end mercerized excepted for the time—until the market is cleared of surplus stocks.

Jobber antagonism to value for cotton hosiery gets its inspiration from the attitude of retailers. A salesman who has been on the road for 25 years for a leading hosiery establishment and makes it a part of his business to ascertain retailer sentiment, had a number of interviews on a recent trip. "I talked with the best merchants on my route," he said, "and all seem of one opinion. They are not in the least excited over the price of cotton, and take the position the public will not pay advances on cotton goods; that mills will not pay current prices for yarn, and that therefore cotton must drop. From what I could gather, it seems there is a concerted movement among retailers to resist prices and that it is their understanding they never again will place forward orders in any line. We will have as good a volume business this year as in 1923, but good size orders will be hard to get, and small mills and jobbers are going to be hard hit."

Mills selling direct to retailers would appear to be in a position for profiting by the well developed retailer determination to buy on the most restricted basis possible, for they have been accustomed to carrying stock, a practice which has been gaining for a year or more and has encouraged small dealers in their policy of buying little and often and getting quick turnover, a policy which last year served them well. Leading retailer manufacturers added a number of new accounts, and several, it is stated, will conduct a campaign for more additions this year.

A mill whose lines are well known last year took on more than 1,500 new customers, and, an executive said, "we have no idea that it will be necessary to reduce our output, for we intend to go after more new business."

In one mill where it was felt lessened production would be desirable, since there had been a decline in sales, the working time was cut by 7½ per cent. The result was contrary to what was expected. The mill help seems to have regarded the reduction in hours as an intimation a slump might be in prospect, and so improved in efficiency and speed that the production was increased. In contrast with this, a unionized mill employing about the same number of operatives as a year ago is getting approximately 30 per cent less production. In this instance, the help, noting some mills were being operated only part time, seem to have decided on spreading less work over the same number of hours, in the interests of operatives employed on a fixed weekly wage basis. The union has been particularly active in the full fashioned mills, where conditions have been perhaps more unsatisfactory than in any other hosiery division.

Informal announcement has been received from one of the more widely known full fashioned silk hosiery mills in Philadelphia that, beginning very soon, operating will be restricted to four days a week, for the purpose, primarily, of reducing stock. It seems the management overestimated the sales for the holiday period. Furthermore, it is purposed to make up goods at about the same rate as distributors take them from the mill. "We have been carrying too much stock for dealers," the management say.

There has been some disappointment over the business in ladies' silk hosiery of the finer class. Mill sales of stockings retailing at four to five dollars a pair have fallen off materially, it is stated by several manufacturers, and there has been witnessed a sharp decline in the demand for lace clocked hosiery. Two mills well known in the trade for their production in such lines are operating spasmodically, at times being idle for a week, and frequently operating from one to three days a week. On the other hand, such mills as the Berkshire and the Oakbrook, in Reading, are running steadily, as are mills in the class of the Hancock and Fidelity in Philadelphia, and their staple numbers of full fashioned have been sold well up into the first half of this year.

Oakbrook, a person authorized to speak for the mill says, has sold its production to July, the business being well distributed among its twelve thread, the chiffon and the all-over silk numbers. It is shown that the jobber mills putting out staples at popular prices are the better situated, this being the case more particularly as relates with a strong run on its eleven thread and chiffon numbers is about to bring out an eight thread as a happy medium for the very sheer and the standard eleven thread. There has been a call for such a stocking.

Direct-to-retailer full fashioned mills, by always having goods in stock for delivery "every hour, on the hour," have been kept well engaged, but there appears to be a less satisfactory situation among jobber mills, with indications that at the beginning of the holiday buying period there were considerable accumulations. In a New York department store, and in one in Philadelphia as well, all-over full fashioned silks have been selling at $1.95 a pair for goods described as firsts—goods for which jobbers pay around $22 to $25 a dozen regular.

It is suspected that much of the stuff displayed for special sales was taken from distress stocks and may have been quite ancient before it reached the department stores. Some jobbers for a time have been suspicious of silk hosiery offered at about mill cost, fearing it may have been in stock long enough to suffer deterioration. One jobber said he would rather pay two dollars a dozen more for hosiery known to come from fresh stock than for goods of doubtful vintage. This, however, cannot be offered as the explanation of those jobbers and retailers for their buying several times a day and specifying deliveries within a few hours.

An order for one case placed several weeks ago by an interior Pennsylvania jobber specified shipment within three hours. He 'phoned the order at noon and required that the goods go out "by next train, express," and by four o'clock they were in transit. In another instance an order for mercerized half hose placed in the forenoon was cancelled in the afternoon. A department store bought on 43 separate occasions in July, a month with but 21 busi-

Helping Famous Hosiery Manufacturers to Uphold Quality

FAMOUS manufacturers of fine hosiery and knitted wear are retaining their leadership simply by sustaining the superior quality of their products.

Granite State Latch Needles are doing their part to help them uphold this quality. They demand Granite State Needles because they know from experience that they are ALWAYS DEPENDABLE and enable the machines to run continuously and smoothly with fewer interruptions —they know that Granite State Needles don't break so often—they know their satin finish cannot fray the yarn as there are no rough latches —they know that every Granite State Needle is exactly like the previous one as they never vary in uniformity.

Granite State Needles not only make smoother running machines but smoother tempered operatives, for there are fewer exasperating stoppages and fewer "seconds."

Here's a needle that is becoming as famous with knit goods manufacturers as their products are becoming famous with the public. Here's a needle you can confidently put on the finest fabric and know that it will help to make that fabric even finer.

Fine quality needles for hosiery and underwear machinery.

GRANITE STATE NEEDLE CO.

LACONIA, N. H.

GRANITE STATE LATCH NEEDLES

ness days. This was of a line of ladies' high class mercerized underwear. Another, during December, sent as many as three orders in a single day to a jobber for silk hosiery, and one reached a maximum of five as a day's orders. These several transactions are matters of record and are being referred to for illustrating the tendency of retailers to depend on mills and jobbers for serving them about as the customer in a retail store expects to be accommodated. Some jobbers are preparing for this new wrinkle in merchandising.

A small hosiery jobber whose trade is with the less consequential retailers receives regularly each week orders from approximately the same dealers, who usually want anywhere from two to five or six dozens, sent parcel post "at once." He says he can depend on a steady flow of orders of this class and that he owes his success to the fact his customers do not have to carry stock, he doing that for them.

Another jobber has issued a booklet for retailer consumption in which it is set forth his patrons may always depend on getting precisely what they want and when wanted. "We carry all the assortments," he tells the little dealers, and "you never will receive substitutions." One manufacturer observed, "It's almost like selling direct to consumers, except we do not employ canvassers."

Direct-to-consumer selling is making headway for those few manufacturers distributing their product in that way. Quite recently one of the leaders in direct selling established an additional office, and its financial report for the year shows an enormous increase in business over 1922.

In the complexity of prices, shipping and trade terms and distribution methods, business in hosiery in some lines is contradictory of what is heard as to others. A mill selling its cotton lines under copyright brands, which have become quite well known in the trade, closed the year far short of its estimated sales. "While we offer price protection to date of delivery," the sales manager said, "we do not seem as able to book any worthwhile amount of sales. Jobbers tell us they are loaded and do not want hosiery at any price." The mill, however, has sold heavily of one featured number.

A Philadelphia mill which last summer brought out a line of infants' socks of artificial silk in new and distinctive patterns sold up its estimated season's production by November, and added machinery. Even at that, the management says, it seems improbable that it will have any goods for taking care of repeat orders. An entirely different story comes from another mill, stocked with infants' plain mercerized socks. The goods have been on the market for some weeks at prices well under the list, and attracted little attention.

Buyers seem to have well defined ideas as to what their trade will want, and are apathetic toward anything that does not conform to their notions. Thus it is shown that price is not the controlling factor. Down-to-the-minute goods are not begging an outlet among down-to-the-minute dealers.

Wool hosiery is giving some dealers no end of trouble. Wool goods, of which dealers, generally, had bought quite liberally, have not been moving. Caught with frozen stock —about the only thing that was frozen during the Fall months of Summer temperatures—retailers became alarmed and bought more sparingly of lines concerning which there seems no doubt.

It was predicted last month that unless the weather became more friendly toward wool hosiery interests very soon, price reductions would be resorted to for stimulating movement. A commission house quite recently was offering at $1.85 a dozen, a line of cotton and wool mix hosiery that a year ago was sold to jobbers at $3.25.

Dealers may clean up of wool socks, but of ladies' goods there is likelihood of stocks to be carried through the summer, particularly as chiffon silk worn in conjunction with very light weight merino understockings promises to be quite popular during the winter.

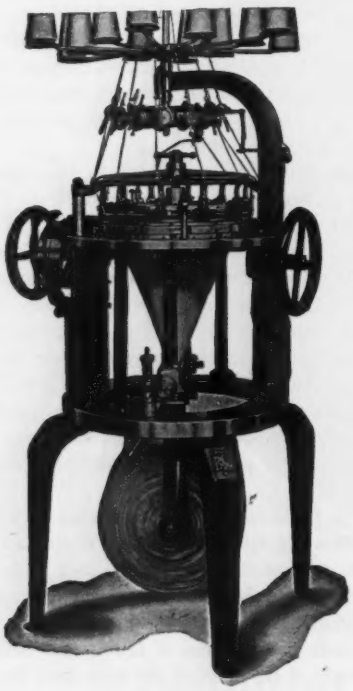
Southern manufacturers again led in the opening of heavy weight underwear. Tennessee and North Carolina mills, which began selling actively about the first of December for next Winter, booked what is commonly referred to in the trade as an astonishing volume of business. The Smith-McClelland Corporation, New York, selling agents for one or more Southern heavy weight mills, were perhaps the first to receive firm orders, buyers taking to a large extent 16-pound suits and 11-pound shirts and drawers. The formal opening occurred when the lines of the Appalachian and Standard mills, in Knoxville, first were offered for each of two early periods—February-May and June-August.

It seems the trade looked on the opening as well timed and prices about right, for there was wholesome buying from the start, and within a week or ten days neither of the two Knoxville mills had anything remaining for the first period, having sold also into the second.

An important jobber, who a few weeks before said those who bought at the opening for more than 25 per cent of their season's requirements would be unwise, that they would be taking a gambler's chance, with all the odds against them, seems to have not reflected the sentiment of some of those jobbers who bought for February to August. The contracts of some of them are for more than 25 per cent of their normal sales. It develops that prior to the opening there had been heart-to-heart talks between manufacturers and jobbers—a species of cooperation that often is lacking. The result was the bridging of a chasm that for a time seemed to some impassable.

Soon after the Southern mills started the ball rolling for next Winter a few of the Northern manufacturers announced they had opened "unofficially." There was some surprise that the New York State mills were so late getting in the procession, particularly when the P. H. Hanes Knitting Co., Winston-Salem, N. C., came out with prices for early deliveries, reserving information as to Summer shipments for a later date. It may be significant that the mills which were the first to open for the season just ended were the first to sell up their production for 1923 deliveries. In fact, the Hanes mill was out of shirts and drawers before the end of November, and was scanning orders for nearby deliveries of suits very closely.

With the inescapable increases in the mill prices of Winter underwear there is reported a further trend toward garments of lighter weight, and this year, probably, more 12-pound suits will be sold than in recent years. One retailer in Chicago—and he probably is not alone—will put into stock nothing heavier than 14-pound suits, and some are disposed to give preference to 12-pound garments. The



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The Cylinders and Dials resulting from such superior methods are then hardened and scientifically tested.

This careful procedure guarantees a precision and durability resulting in the consistent production of faultless even fabric.

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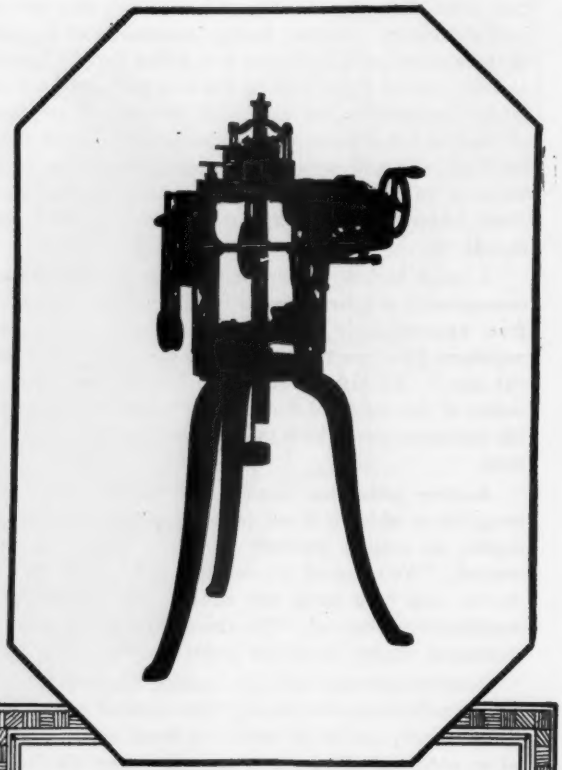

BRINTON RIBBERS

possess all modern improvements, including selvage welt, French welt, double knee dogless and striping attachments, with automatic stop motions.

Built in all sizes for all classes of rib work.

We also build hosiery knitters and Body machines for underwear and various other circular machines for all kinds of knitted articles.

Samples and prices on request

H. BRINTON COMPANY

Kensington Ave. & "M" Street

Philadelphia Pennsylvania

idea is, of course, to escape disturbance of price ranges, depending on the public to wear lighter garments.

The fleeced underwear lines of the High Rock Knitting Co., Philmont, N. Y., were taken off sale early in December. From that time the mill was accepting no orders except for goods in cases, buyers taking assortments as they found them. At the prices which came out a few days later for next Winter, on a somewhat higher level, there was some little buying for the current season, so that in certain instances 1924-5 prices were being paid for underwear for 1923-4 consumption. Jobbers, as often is the case during a rise, overstayed the market. To a great extent they repeated the blunder as to Summer weights for this year, although having bought fairly well ahead.

When buyers come to market with repeat orders for men's bal briggan and ribbed underwear they will pay higher prices. Stiff advances already have gone in effect and others are to be announced, it is understood. Then will come the pinch. Summer underwear in stock and on order is owned at 1923 prices, and the public should escape any increase until late in the season. Some retailers say they will wait until they see how advances on Summer underwear are received before placing orders for heavy weights. If they find general resistance, one dealer said, their orders for next Winter will be placed very late.

Most interests look for a material increase in sales of men's knitted Summer underwear, as a result, mainly, of extensive advertising of the knitted by organized manufacturers. Their campaign appears to have been launched at the psychological moment, for nainsooks had started to wane, with the skimping of the cut-and-sewn garments by ill-advised makers who were striving to get cost down to conform to the ideas of some distributors.

Cheapening of the nainsooks operated to the detriment of those manufacturers which had recourse to that expedient for accommodating buyers who want price rather than quality. But the process was helpful to such establishments as the Hanes, Topkis, B. V. D. and others in their class. Their sales last year were in excess of those of any previous year, and duplicate orders already have been received. The public is not friendly to high prices but it is less friendly to underwear in the making of which forty inches of cloth has to be cut from a yard.

Men's underwear has made a good primary market start for 1924, but the outlook for ladies' light weight knitted garments is not so promising. Mills had difficulty in marketing their product from double carded 30s yarn at 45-47 cents, and in some establishments there are light stocks, which now ought to be moved profitably, if manufacturers do not continue production, which more than a year ago was overdone. It should have been apparent that silk underwear for summer was making such headway that less of the knitted would be required. Yet as late as 1922 new mills were being established in Pennsylvania. Several months ago a dozen were for sale. Operations by manufacturers of ladies' pants and vests have been jerky since early Summer. It will be on a more satisfactory basis when production has been cut to fit demand.

Fairly steady business in sweaters for next Fall and Winter is reported, and there is encouraging interest in the more fetching lines for Summer wear.

Low price cotton sweaters, which opened at less than last year's figures, have been bought somewhat heavily for Fall. Some competing lines opened at $1.50 a dozen higher and sold equally well, and several lines were taken off sale within six weeks after the opening.

While a number of New York State underwear mills last year engaged in the manufacture of sweaters and are getting their share of the business, it is felt that the high prices of both cotton and worsted yarns will operate against over production of staples. The fate of novelties will rest on the degree of satisfaction with which they shall be received by buyers.

The outerwear primary market is in good shape at the beginning of the year, while the situation as to bathing suits as a class is not satisfactory to either manufacturer or jobber. But no one seems to able to state why.

Among the Knitting Mills.

The Smith Hosiery Mills, Chattanooga, Tenn., is to construct a hosiery mill to cost $50,000, 100x150 feet, to house 100 knitting machines, giving a daily capacity of 500 dozen hose. The machinery will be electrically driven. Officers are: G. B. Smith, president; J. W. Bishop, vice-president; T. T. Rankin, secretary; Felix Miller, treasurer; and H. A. Wingers, manager.

Apalachie Hosiery Mills, Landrum, S. C., have been incorporated, capital $50,000, with Joseph Lee president and B. F. Owens secretary. Construction work has begun on a 120x40-foot brick plant to cost $30,000, and 100 knitting machines will be installed.

Davenport Hosiery Mills, Chattanooga, Tenn., will erect a two-story brick addition, 50x90 feet, to be used as a warehouse, shipping department and general office. The cost will be approximately $25,000.

Muncey Mfg. Co. will build a knitting mill at Galax, Va. George T. Penny is president.

Orton Knitting Mills, Kinston, N. C., are installing machinery for knitted outwear. The mills are now manufacturing hosiery and the underwear will be an added line of product.

The Dusenberry Corporation, Detroit, Mich., has taken out a state charter to manufacture knit goods and other cotton products. The company is headed by Frederic W. Hartman and Louis H. Dusenberry, 207 Marston Street, and plans are under way for the early operation of a local plant.

The F. Y. Kitzmiller's Sons Co., Reading, Pa., has been organized under Delaware laws with capital of $1,000,000, to operate knitting mills at Reading, Philadelphia and other points. The new company is headed by Frank Y. Kitzmiller, formerly vice-president of the Taubel-Scott-Kitzmiller Co.

The Burditt Knitting Co., Mitchell, Ont., plans for the early installation equipment in a new plant building.

The Walton Knit Wear, Inc., New York, recently incorporated with capital of $15,000, for the manufacture of cotton knit goods, etc., plans for the early operation of a local mill. I. Nelson and B. Wisham head the company, which is represented by S. M. Heyert, 5 Beekman Street, New York.

Lewis E. Taubel, head of the Star Knitting Mills, Norristown, Pa., has chartered a new company to be known as Lewis E. Taubel, Inc., capitalized at $750,000, to take over

and expand the present knitting mill. Mr. Taubel is treasurer of the new organization.

The C. & K. Knitting Mills, Inc., New York, has filed notice of intention of operating at Jersey City, N. J. Edward Schur, 340 Claremont Avenue, Jersey City, is the representative.

The Utica Knitting Co., Utica, N. Y., has preliminary plans under advisement for the construction of a new local plant, with reported cost placed in excess of $80,000.

The Snappy Knit Wear Co., Brooklyn, N. Y., recently formed with capital of $20,000, to manufacture knit goods, plans for the early occupancy of a local mill. S., D. and C. Shifreen head the company. It is represented by M. Gelles, 1148 Broadway, New York.

The Lancaster Knitting Mills, Brooklyn, N. Y., have been organized with a capital of $20,000, to operate a local plant. The company is headed by J. and T. H. Kauderer; and is represented by Joseph Hammerman, 15 Park Row, New York.

The Knitted Products Mills, Inc., Buffalo, N. Y., recently organized with a capital of $50,000, has plans under way for the operation of a new local plant. The company is headed by F. D. White and H. Schoenfeld; it is represented by Aaron & Dauch, Buffalo, attorneys.

The Gropper Knitting Mills, 632 Broadway, New York, have arranged for an increase in capital from $200,000 to $1,500,000, for expansion.

The Carthage Hosiery Mills, Carthage, Mo., recently formed with a capital of $50,000, have plans under way for the establishment of a local knitting mill to cost about $45,000. Paul F. Vogel, Belleville, Ill., heads the company.

Cotton and Yarn Trading in China.

(*Continued from page* 292.)

tomer well. The amount of gain or loss must be paid either way within three days after the business is done. As a rule, all these little items are strictly carried out by both parties. Besides actual cash, government bonds and other negotiable papers are accepted at a certain per cent off as substitutes. Sometimes strangers without proper introduction from friends of brokers, without giving ample amount or safe forms of margin money, may be looked upon suspiciously and often are refused any transactions.

As a rule, when the country is peaceful and the demand is constant, the price of yarn and cotton goes in sympathy with American and Indian cotton, and Japanese yarn, which is closely in sympathy with American cotton. Before the first quotation is fixed in the morning, the speculators and cotton mills first see the New York, Liverpool, Bombay, Sampin (Japan) quotations, and then study the political conditions of the country, before they are willing to take any chances in buying or selling. Before 9 a.m. each of these quotations is written on blackboards for that day and a day previous, for comparative purposes. Of course, the telegraph arrives here a day late. It has happened that many times during the last year American cotton has dropped 100 or more points and Japanese yarn jumped up five yen, at the same time, or vice versa, the telegraphic quotations being delayed, and the speculators having to gamble blindly. The Japanese play on yarn and cotton, and cotton merchants of other nationalities are often mixed in the cotton market. When the news of certain foreign firms doing speculation in either yarn or cotton reaches the public, the Chinese speculators put oil on the fire by also going in and the result is either a big jump or a big drop in prices. So far as is known the British mills in Shanghai have never mixed themselves in this game yet.

New reports and groundless rumors often have a great effect in the yarn and cotton market. For instance, during the time of the political muddle, a groundless rumor may reach the exchange that a certain general is transporting troops from one place to another, or worse, that the noise of cannons is audible—then within a half an hour the price of yarn may drop a couple of taels. During the last few months the political conditions of the country have been more or less critical and any exciting news or rumors upsets the nervous minds of the speculators. This has happened time and time again. Even when the news of the death of President Harding reached Shanghai at noon, about three o'clock the price of cotton dropped suddenly half a tael per picul and yarn about two taels per bale. The people thought that American business would be bad, and that cotton would drop, at least temporarily, which in turn would knock down the price of Chinese cotton and then yarn.

Cotton yarn is entirely consumed in this country, while on the other hand, cotton is being used in domestic mills and is also exported to foreign countries, especially to Japan, who, when American cotton is too dear, will buy the whole bulk of the Chinese cotton crop. It happened in 1922, between September and October, when the cotton had reached its lowest level of 26 taels per picul, then the Japanese came in the exchanges, and besides sent many agents to the interior to buy as much cotton as they could get hold of, gradually the price came up to as high as 45 taels per picul. In other words, the mass of the people, particularly the farming class, don't know and don't care what happens outside of their little world. As long as they think they can get enough, and are satisfied with the price offered to them; they would sell their cotton regardless of what conditions really were and what their friends informed them.

There is no government bureau or authorized agency to give out any estimate of the new crop, so that everyone must look out for himself. During the severe storms and continuous long rainy seasons, the price shoots up within a comparatively short time. Tungchow, being a great cotton growing center, its cotton experts sometimes see an advantage in buying futures, but when the news spreads that they are buying, the speculators all jump in together with them. Besides gambling on the weather, the Chinese speculators gamble on luck, too, as conditions in America are almost unknown to most of them.

Relatively speaking, the foreign speculators—including the Japanese—have been fairly successful winners in the Chinese cotton and yarn market, while on the other hand, the Chinese are much divided—more losers than winners—and perhaps more money is lost through this channel than in any other form of gambling.

American cotton not only dominates the European cotton markets, but also the Japanese and Chinese as well. Should anyone not be informed on the supply and demand of American cotton all the world over, he is not well qualified to own mills in China, or at least his future career there is not safely assured.

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Uniformity guaranteed by test before shipment.

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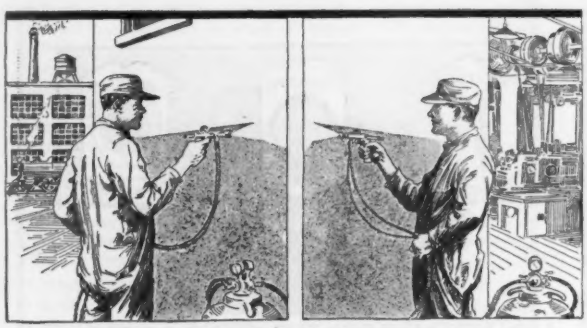

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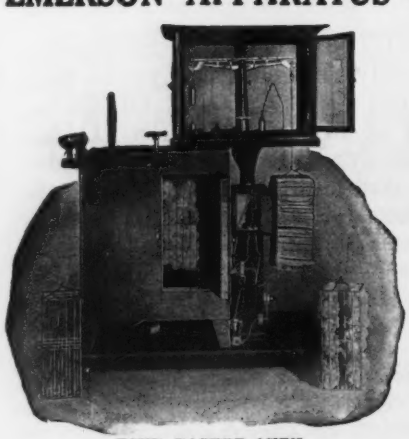

FOUR BASKET OVEN
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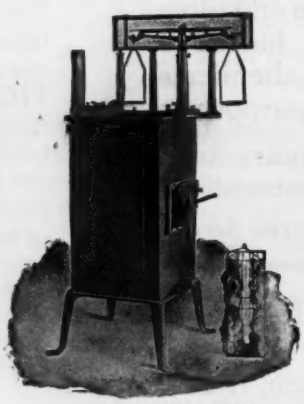

SINGLE BASKET OVEN
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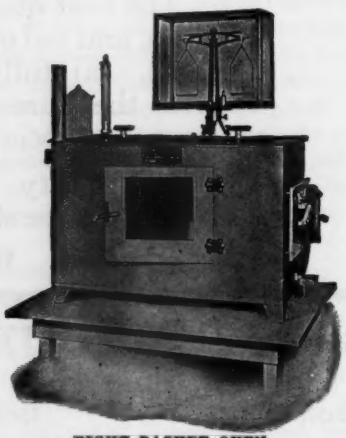

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Absolute uniformity in every type of work can be obtained with the Automatic Timing Device which gives accurate control over the time of extracting. Different baskets for different textile requirements. Write today for details.

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Bleaching	Kier Boiling
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Some manufacturers even specify limited "working ranges" within the chart scale.

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Two and a half years ago Foxboro engineers discovered an entirely new method of making the Foxboro Helical Tube Movement.

So important was the discovery—so far-reaching its consequences that although Foxboro engineers were positive of the result, no announcement was made until the movement had demonstrated its superiority in every conceivable test of service.

We can now announce that the Foxboro Improved Helical Tube Movement overcomes all the so-called "necessary evils" of Recording Instrument construction.

It is permanent in calibration.

It does not weaken in service. It needs no adjustment.

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Accuracy within less than 1% of total scale reading is guaranteed.

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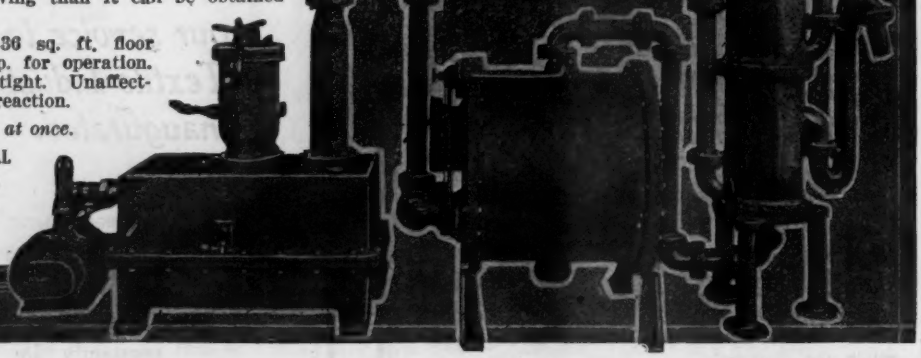


RODNEY HUNT MACHINE COMPANY

Basket 111g

For a Permanent Bleach

Rodney Hunt Reel Machine

Bleaching in Rodney Hunt machines by the slack-loop method is giving many mills the much desired combination of a permanent bleach and a fine finish.

Features of the Slack-Loop System

Fabrics are processed in continuous string from one machine to another, or in one machine as a unit. The resulting goods, in addition to being uniformly treated, are stronger because of the gentle yet positive action of Rodney Hunt machines. This action eliminates the excess of strain and stretch that mars fabrics in wet finishing.

It handles a wide range of fabrics

It successfully handles all types of cotton fabrics, from the lightest voiles to heavy cotton damasks.

Find out more about the many advantages of the slack-loop system as carried out in Hunt equipment; we'll gladly send further information.

RODNEY HUNT MACHINE CO.

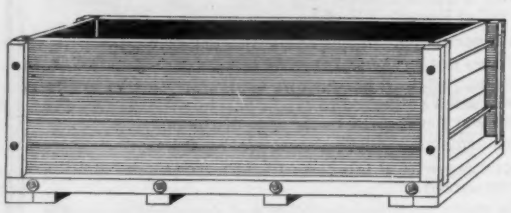
47 MILL STREET ORANGE, MASS.

OVER HALF A CENTURY'S SPECIALIZATION

RODNEY HUNT

LOUISIANA RED GULF CYPRESS

is the best Wood for Dye Vats



The G. Woolford Wood Tank Manufacturing Co.

Office Lincoln Building, PHILADELPHIA, PA.

MAKE THE BEST DYE VATS

Your Inquiries solicited.
See Consolidated Textile Catalog, Page 214, or ask for Catalog.

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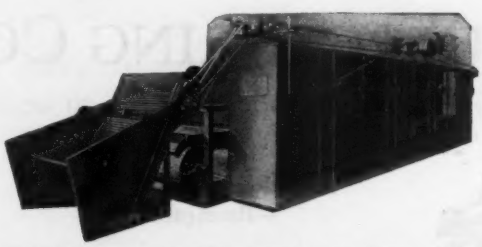
Of the Wonderful development in Southern Textiles. Every Superintendent in the South welcomes the day when Southern Manufacturers supply him with equal or better materials.

SIZING AND FINISHING MATERIALS

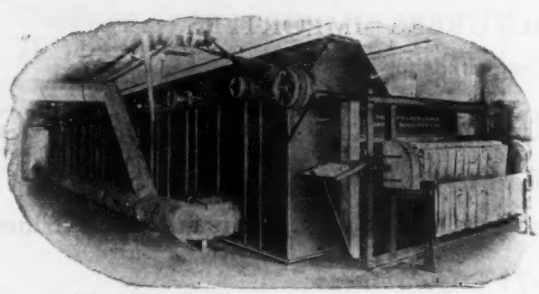
HAS PROVEN ITS SUPERIORITY

It Gives maximum results at a minimum cost. Test it, you'll use it, be benefited and in so doing, foster a Southern Textile development.

CHARLES R. ALLEN, Manufacturer, Charleston, S. C.



Automatic Stock Dryer for Wool, Cotton, Hair, Linters, Rags, With Patented Spirally Woven Sectional Wire Cloth Conveying Apron



Automatic Yarn Drying and Conditioning Machine

For Cotton, Woolen, Worsted, Silk, Linen or Jute Yarns

"HURRICANE" DRYERS

The "Hurricane" Line of Drying Machinery Includes

Automatic Loop Dryers
For Underwear, Toweling, Piece Goods, Silks, Plushes, etc.

Continuous Piece Carbonizing Machines

Automatic Yarn Dryers
For Cotton, Worsted, Jute, Silk and Artificial Silk Yarns

Truck Dryers for Yarn
Tape, Braid, etc.

Automatic Raw Stock Dryers
Single and Multiple Apron Types for Wool, Cotton, Linters, Hair, Flax, etc.

Automatic Raw Stock Carbonizing Machines

Automatic Yarn Drying and Conditioning Machines for all kinds of Yarn.

Truck Dryers for Yarn
Dyed on Cones.

Hosiery Dryers
Dyeing Machines

A "Hurricane" Dryer for Every Material

Complete Equipments for

Bleaching, Dyeing and Drying

Send for illustrated Catalogs.

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Boston Agency
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Katigen Deep Black GGN Conc.

A standard of shade, strength uniformity and value.

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THE ARABOL MANUFACTURING CO.

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of any kind of Compounds for

SIZING SOFTENING FINISHING WEIGHTING

for all Textile Purposes

Sizing Tallows, Filling Materials, Printing and Stiffening Gums, Rosin Soaps, Dextrines

Soluble Oils, 50%-75% Guaranteed

Boil-Off Oil **Degumming Oil** **Hosiery Oil**

Many years' practical experience of our technical staff enables us to meet all your requirements. Our Textile Research Laboratories are at your disposal. Your correspondence and trial orders are solicited.

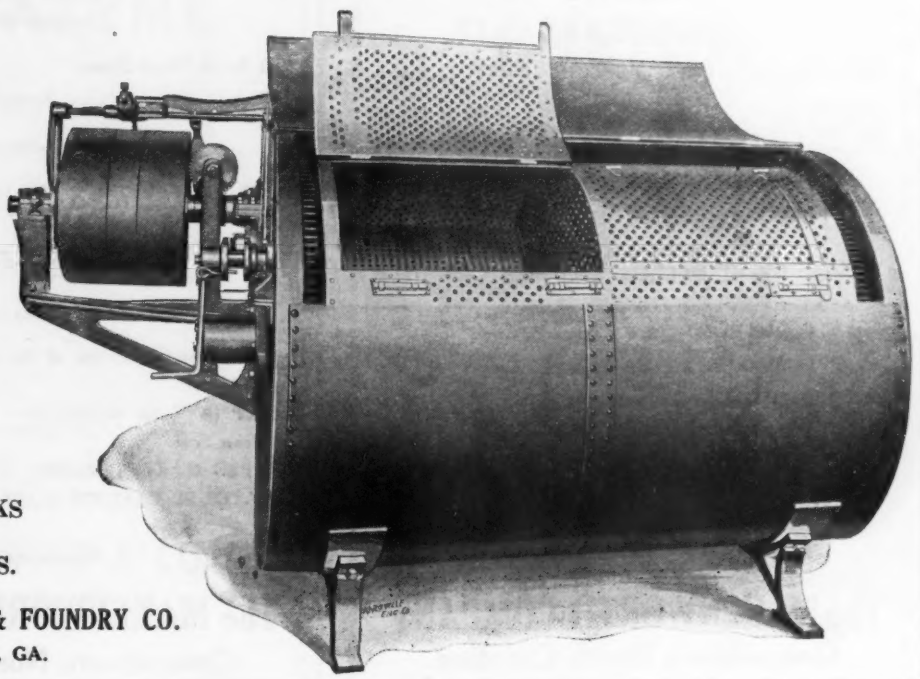
The Improved ROME Dyeing Machine

Made of

MONEL METAL

Capacity
200 pounds
per load.

Other sizes
built to order.
Also
STEEL
ROTARY
MACHINES
and
STORAGE TANKS
for
SULPHUR DYES.



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ROME, GA.

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Water Filters and Water Purifying Apparatus to meet all textile requirements and industrial demands.

Simplest, quickest, easiest filters to operate .... In every way satisfactory .... Giving good results .... Meet all the requirements .... Filters you installed ten years ago are working splendidly .... The repeat orders you have received from these works should settle all doubts .... The water as filtered enables us to do certain finishing that could not be one before .... Very glad to recommend your filters to anyone desiring pure water.

Send for descriptive literature. Plans and estimates promptly supplied without obligation on your part.

HUNGERFORD & TERRY, INC.
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Rohm & Haas Company Inc.

Manufacturers of

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SODIUM HYDROSULPHITE—
Sulphoxylates and Allied Products.

LYKOPON—Sodium Hydrosulphite—
For reducing Indigo and vat dyes. Of highest quality and absolutely standard.

FORMOPON—For discharging.

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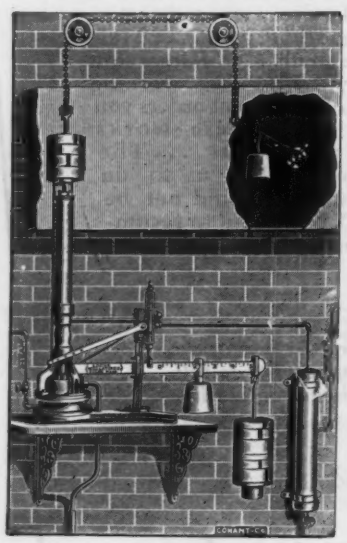
TRADE
1921 MODEL **LOCKE** With Improved Pilot Valve
MARK
DAMPER REGULATORS



THE LOCKE Hydraulic Automatic Damper Regulator was invented by Mr. N. C. Locke at a time when the regulation of dampers was chiefly by hand and, at best, at a variation of 10 to 15 lbs. steam pressure. The LOCKE Regulator makes it possible to automatically regulate from one to twenty dampers, from the smallest to the heaviest, at a variation of steam pressure of one lb. or less. A LOCKE Regulator is as essential as coal in the up-to-date power plant. There are $3,000,000 of "LOCKE'S" in active use today, whose purchase was based on the fact that official Government tests prove that a "LOCKE" means 10% to 14% saving in coal consumption.

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COMPENSATION

As unchanging as the laws of nature is the law of compensation in profits. If in the sale and use of

Wyandotte Textile Soda
Wyandotte Concentrated Ash
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the only ones benefited were their makers, they would soon wear themselves out and go off the market.

But since the rule "Once a user always a user" with rare exceptions remains true when applied to these Wyandotte Products, then it must be true that the user of these products is also benefited, and too, in like measure to the amount he pays for these materials.

If you are not a user of these unusual products, write us for further particulars or that you are willing to be "shown."

Order from your supply house.

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DIASTAZYME

A product for conversion and removal of starches, sizings, etc.

DIASTAZYME tests high and is especially adjusted for Textiles.

Ask for sample. The product will prove itself.

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For Cotton Piece Goods

"It gives a softer finish"

BORNE, SCRYMSER CO.
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Works: Elizabethport, N. J.

"ARTCO" SILK OIL

for
***use on* Artificial Silk**

Hosiery and Sweater Knitters find "ARTCO" Silk Oil to be the best product for this purpose.

Prevents waste and saves time

Softens the Thread and lays the Fibre, and produces a Fine Lustre.

Samples and full information on request.

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Uniform in Application

VICTROLYN

Penetrating, Lubricating, Dependable Assistant in Warp Sizing

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will remove Oil Stains.

If you are troubled, write us.

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Unexcelled for silk dyeing and printing.

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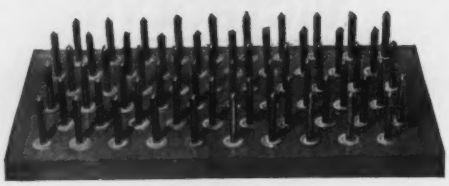

Patent Rights Pending

Are You Responsible

for good weaving in your mill? If so, you should know Kore-Lokt Pin Boards and the story of their usefulness in modern loom equipment.

Expert Opinion from men in charge of the weave rooms in prominent mills is available to superintendents and overseers upon request.

Send for this information so you may know the merits of Washburn Kore-Lokt Pin Boards as an improvement over old style Filling Boxes. Learn how the other fellow checks up results from the "Build of Bobbins."

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PERFECTION SHELL ROLLS

FOR
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BALL WARPING
FINISHING PLANTS
CORD FABRIC SHIPMENTS

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You All Know This Box!

JOHN HETHERINGTON & SONS, Ltd.

MANCHESTER, ENGLAND

Makers of High Grade Textile Machinery

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HOPPER BALE OPENER
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WASTE SHAKER
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AUTOMATIC FEEDERS
CREEPER FEEDS
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Manufacturers of Bobbins, Spools and Skewers

OUR SPOOLS:—

Are made to stand severe service and are made from thoroughly dried stock, so constructed that they are giving entire satisfaction.

OUR BOBBINS:—

Are made from the best grade of stock, and through the efficiency of our workmanship, are true running, and properly fitted on spindles.

OUR PRODUCTS:—

Bobbins—Warp and Filling. We put on all kinds of metal shields and caps.
Speeders—Plain; steel rings; metal base.
Spools—Warper; Twister.
Our Metal Bound Spools are pronounced the best on the market.
Skewers—Cop, Warper and Roving, of all descriptions.
Twisters—Universal Winder Rolls and Bobbins, Comber Rolls, etc.

We Specialize in New Mill Equipment

CHARLOTTE SUPPLY CO., SOUTHERN AGENTS.

"The Strongest Basket Made"

№ 7

UNDERNEATH the heavy cotton duck is a sturdy frame of Round Spring Steel. This steel gives the Morris Basket its great strength.

They are built to last for years, and time has proven that they stand up under the roughest usage.

There are no nails or sharp or rough corners to damage the goods.

For every mill usage, there is a type of Morris Duck Basket, with either wood or steel runners. We also manufacture Steaming Baskets with brass eyelets, Shipping Hampers with hinged wood covers, Shipping Trucks, Laundry Baskets, etc.

№ 19

The Morris trade mark stands for

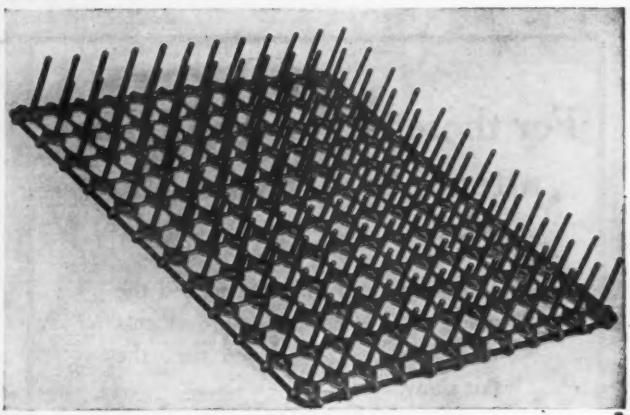
A Good Basket—
A Fair Price—
A Prompt Delivery—
A Pleased Customer.

Ask us to send you booklet and prices.

MORRIS & CO., Inc.
GROVEVILLE, N. J.

For Sale By
WILSON COMPANY
Greenville, S. C.

MORRIS BASKETS



Metal Board for Cotton, Woolen and Silk Mills. (Patented)

The "DAVIS"

METAL FILLING BOARDS AND METAL TRUCKS

In Use in Over 300 Mills

The "Davis" Metal Specialties for Textile Mills are known throughout the country as the highest class products in their line. Every department is supervised with great care in each and every detail so that we may know that each product will bring forth praise rather than complaint. All boards are galvanized after they are made to prevent rusting. All trucks are painted with a high quality preservative black paint to make them water, acid, alkali, steam and gas proof.

We will gladly send you a sample board if you will send us one of your wooden ones or two of your quills or bobbins, stating how many you require to the board.

Full information and prices on any of the Davis Products listed below will be sent on request, or complete catalog if you desire.

BOBBIN BOARDS	HARNESS TRUCKS	WARPER'S BOBBIN
QUILL BOARDS	DRAWING-IN FRAMES	BOARD RACKS
TRUCKS WITH SLIDING SHELVES	SKEIN BASKETS	QUILLER BOARDS
SHAFT RACKS	WARP TRUCKS	TRUCKS
CONE BOARDS	SLIVER LAP RACKS	DOFFING TRUCKS
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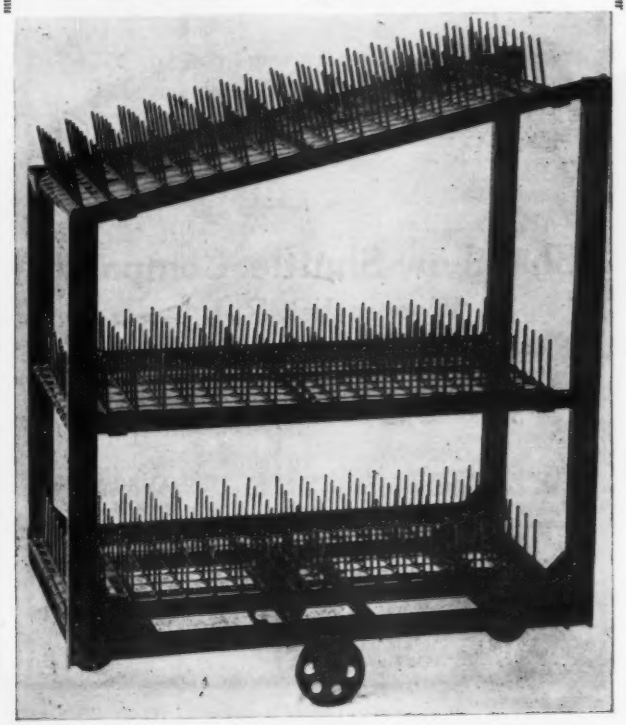
CABINETS FOR SILK	TRUCKS FOR 3 TO 6 REELS	BOARDS AND STANDS

BOARDS FOR JACK ROVING AND RIBBON LOOMS

FRANK DAVIS MFG. CO.

424-426 MAIN ST. EST. 1899 PAWTUCKET, R. I.



Twister Doffing Truck

For those of you who did not attend the Textile Show

It was too bad that you missed the many new ideas and improvements that have been developed since the last show.

At "Shuttle Headquarters" for instance, there was an unusually interesting display of Shambow "Custom Built" Shuttles.

They created much favorable comment.

But, because you did not see them at the show is no reason why you shouldn't have an opportunity to see them.

We are prepared to send you a man who will show you shuttles and weaving devices of great interest to you. He is a Shuttle Engineer and should you require it, he is fully capable of redesigning your present shuttle or designing an entirely new model for you.

This expert service won't cost you a cent and may save you much money. Just sign and mail the coupon or write us.

Shambow Shuttle Company

Woonsocket, R. I.

JOHN C. SHAMBOW, Pres. & Treas. H. H. ULLMAN, V. Pres. & Gen. Mgr.

Philadelphia 42, 421 Bulletin Bldg. Paterson, N. J., 245 Straight St. Greenville, S. C., Southern Factory

COUPON

SHAMBOW SHUTTLE CO., Woonsocket, R. I.

We will be interested to learn more about the new shuttles, tensions, threaders and other devices without obligating ourselves in any way.

Company .....

By .....

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shuttle bills smaller
interruptions fewer
production greater
products better

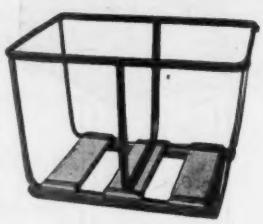
The Basket You Can Renew

WHEN the canvas wears out, all you have to do is remove the demountable rim and slip on a new Smith quality canvas container. Two-thirds of the original cost of the basket is saved.

THE

SMITH'S TRADE 100% MARK BETTER BASKET

we honestly believe is the most durable and economical basket for textile mill use. The steel frame is indestructible high point carbon flat steel with round edges. The frame is firmly clamped and fitted into the highest grade hardwood skids with cross slats which can also be renewed should it become necessary.

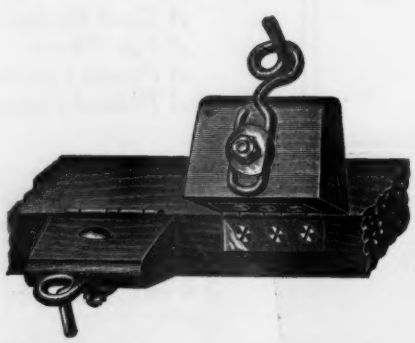


A trial will convince you.
Order one or more today.

SMITH MANUFACTURING CO.

DALTON, GA.

The Palmer Adjustable Thread Guide



For Ring Spinning and Twisting Frames

Easily Adjusted.

Extreme accuracy and permanence of setting.

Cheapest of them all.

Mail guide-block for free sample.

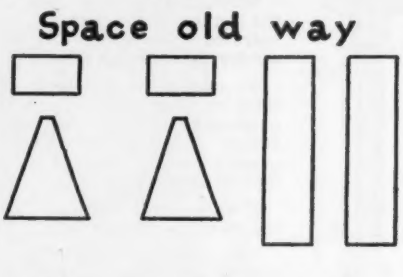
Patented and manufactured by

THE I. E. PALMER COMPANY

Middletown, - - - Connecticut

NEW AUTOMATIC CREEL

for direct warping from FILLING WOUND BOBBINS



COMPLETELY ELIMINATES the

Spooling of the yarn

Spooling waste

Undue and irregular tension of yarn due to spooling

Stoppage for doffing

Doffing is done while warper is running.
Greater production from better warps at lower cost.
Better loomage from auto-creel warps because
Elasticity is preserved in yarn.

For Information address

AUTO CREEL CORPORATION, NEW YORK

Room 915, Fifth Ave. Building
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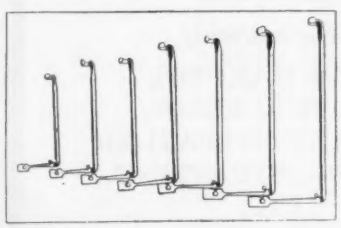
GREETINGS OF THE SEASON

Right now is the time you should consider your Machinery. Inspection time is at hand, and we are especially equipped to align and level your shafting. In doing this—we use the Kinkead system which is recognized internationally. REMEMBER—we we can duplicate any sample Flyer Presser submitted. Estimates gladly furnished.



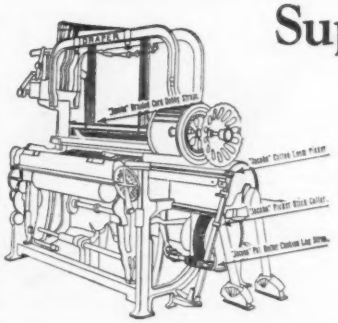
Southern Spindle & Flyer Co., Inc.

Manufacturers, Overhaulers and Repairers of Cotton Mill Machinery

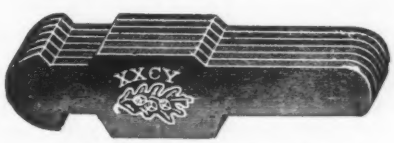
CHARLOTTE, N. C.

W. H. MONTY, Pres. and Treas. W. H. HUTCHINS, V. Pres and Sect.

Our "Loom Supplies"



are used by Draper Corporation, Crompton & Knowles, Mason Machine Works, Stafford Company, Hopedale Mfg. Co.



"JACOBS" XXCY DOLL PICKER

COTTON LOOM SIZE AND DUCK LOOM SIZE

Only pure oak bark tanned leather is used in this quality of picker, and it is treated by a secret process, giving a maximum of resiliency in the cushion or body where the shuttle strikes, which, it can be readily seen, represents the vital point of value in a loom picker.

The construction of this picker commends itself strongly. We should like to send all the samples you can use

A Complete Line of "Jacobs" Loom Supplies Carried in Stock by all the Largest Supply Houses.

E. H. JACOBS MANUFACTURING COMPANY

DANIELSON, CONN.

Motion Pictures

A COMPLETE SERVICE

For Industrial Enterprises

PROGRAMS—A constant supply of well-balanced productions, prepared by specialists who know non-theatrical motion picture needs; pictures that are clean and inspirational, combining ENTERTAINMENT WITH INSTRUCTION and **eye-training for citizenship.** SAFE because printed on NON-INFLAMMABLE stock eliminating fire hazard.

EQUIPMENT—Your projection problems solved by our experienced, specialized engineers.

CO-OPERATION—Every help of our comprehensive organization to help you make the utmost of AMERICAN MOTION PICTURE INDUSTRIAL SUBJECTS.

Write for Complete Information.

AMERICAN MOTION PICTURE CORPORATION

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WATER SERVICE

"Sandow" Fountain Self-closing

Murdock Products are the outcome of over 70 years of cumulative water service device knowledge.

No product has ever been released from the factory until we knew it to be thoroughly practical for its purpose and mechanically beyond reproach.

That is why they are giving absolute satisfaction.

INDOOR DRINKING FOUNTAINS that are real water devices made for shop service. FOOL PROOF. The patent bubbler head affords a full soft bubble and a satisfying drink. A thin squirting stream is impossible.

"Genuine" Murdock Self-closing Hydrant

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MURDOCK OUTDOOR BUBBLE FONT FOR PLAYGROUNDS

Write for fully illustrated catalogues.

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CINCINNATI, OHIO

Makers of Anti-freezing Water Devices since 1853

Cost

may be a primary consideration

The Liberty Knotter

not only fills the requirements of low first cost but is most simple in construction and economical in upkeep and operation. Give it a trial.

Guaranteed for one year

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WEAVING REEDS,
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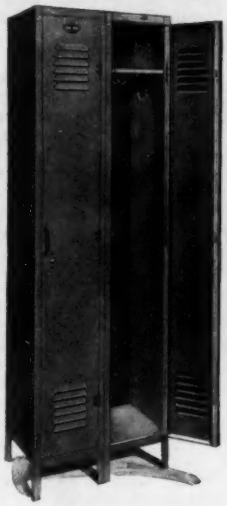
ETC.

We make a specialty of Harness for Warp Drawing Machines

"No Better Built than Durabilt"

DURABILT

STEEL LOCKERS



Designed for Hard Service—Built of Finest Materials —Finished with Care

Exclusive Features

1. Concealed, one-piece, automatic Latching Device.
2. Straight-lift, stamped-steel (not cast) Handle.
3. Five-knuckle, full-looped, double-wear "strap" Hinges.
4. Scientifically reinforced rigid Door.
5. Extra heavy, countersunk riveted Door Frame.
6. Unusually Large Ventilating Louvres.

We are qualified by experience to render real assistance on your locker requirements. Write us at Aurora. Your inquiry will be referred to the Sales Office nearest you.

We are also manufacturers of Steel Storage and Wardrobe Cabinets

Send for Circular 5008

DURABILT STEEL LOCKER CO.

420 Arnold Ave. **Aurora, Ill.**

Sales Offices in all Principal Cities

Williams' Heddle Frames and Heddles

are a scientific combination for the weaving of all fabrics. Williams' frames are built to last, are light in the looms, in fact the combination that you need to insure improved quality fabric. Ask about our improved iron end frames —also our double frames. We specialize in the manufacture of section frames for the weaving of narrow fabrics. Bank on the manufacturer of THREE-FOURTHS of the heddle frames used in this country and Canada.

The J. H. Williams Co.

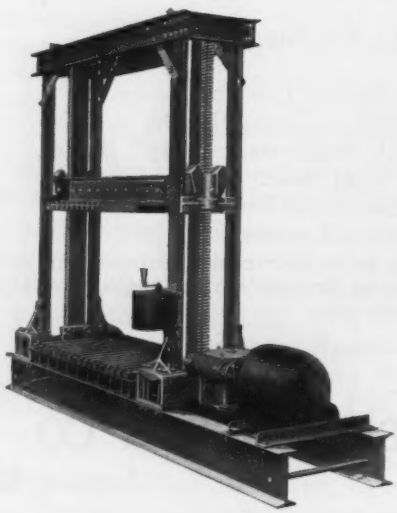
"The Shuttle People"

Millbury, Mass.

Geo. F. Bahan, Charlotte, N. C., Southern Representative

Another

REX PRESS



New Cloth Press

Speed, Strength, Simplicity

Built any size and pressure.

The Rex Creed

To build a press so good that the simple truth about it will be adequate recommendation and to price it so fairly that its value can never be questioned.

Watch for the Yarn Press.

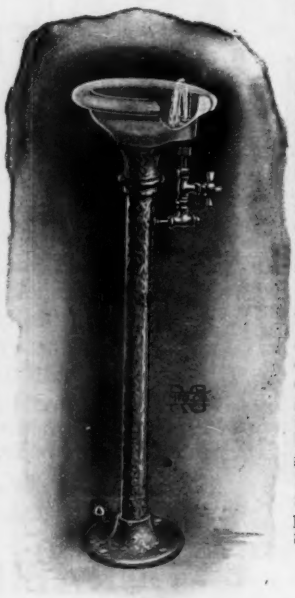
REX ENGINEERING CORPORATION

Dunkirk, N. Y.

J. S. HULME

Southern Representative
11 East Fifth St.,
CHARLOTTE, N. C.

Lips Cannot Touch The Nozzle



THE RUNDLE-SPENCE Vertico-Slant drinking fountain has no hood on which the corner of the mouth can rest.

No filth collecting crevices that are impossible to clean but is neat in appearance and absolutely sanitary in every respect. Made in a variety of designs to meet every requirement.

Winter or summer, pure cold drinks are a sure stimulus to the best efforts of your workmen. They prevent that fatigue that comes with thirst and keep every man fresh for greater effort. But if they must go to a distant hydrant for those drinks, time wasted brings a loss instead of a gain in production.

Let them turn to convenient bubblers—equip your plant with R & S VERTICO-SLANT fountains.

Catalog Furnished on request

Rundle-Spence Mfg. Company
MILWAUKEE **WISCONSIN**

ATTRACTIVE
SANITARY

MILLS METAL

PERMANENT
ECONOMICAL

TOILET PARTITIONS
DRESSING ROOMS
SHOWER STALLS
SHELVING
TABLES
DOORS
BINS

"MILLS METAL" Products are permanent investments, and their design makes them the most adaptable products of their kind for textile mill use.

"Slant Lip Diamond Rail Top and Bottom"

Constructed entirely of the highesy quality rust-resisting steel. Finished in Olive Green or Gray Baked Enamel.

Write for bulletins.

THE MILLS COMPANY
Dept. A, **Cleveland, Ohio**

PERKINS PRACTICAL BRUSH
ATLANTA BRUSH COMPANY

BRUSH QUALITY

Imagine that on your desk are two brushes. Two Comber Dusters. They look exactly alike, except that one is priced higher than the other. You can tell no difference.

Of course, you cannot You are not a brush expert. But the difference is there. Cheap brushes are made of cheap bristle. Just as an illustration the bristles we use in Atlanta Brush Co. brushes cost four times as much as bristles we could use if we were not quality cranks.

We make only one kind of Brush—the best it is possible to produce. Then we price it fairly and guarantee it absolutely.

The genuine is marked with our name.

ATLANTA BRUSH CO.
ATLANTA, GA.

ATLANTA BRUSH COMPANY
A Brush for every Textile Need

Electric Scrubbing!

Promotes Better Work through Cleaner Floors

BATES MFG. CO., Lewiston, Maine.
Manufacturers of Ginghams, Bedspreads and Damasks.

Such a manufacturer as the Bates Mfg. Co., noted for the high quality of its output, finds the service of FINNELL Scrubbers extremely profitable.

There is not half the danger of spoilage through soiling in such a mill. The FINNELL **System of Electric Scrubbing** keeps floors as near to being spotlessly clean as is humanly possible. It maintains this cleanliness for much less than it costs to keep floors even partly cleaned by old fashioned hand and knee scrubbing. More than three hundred textile mills have adopted the FINNELL System. It has proved its worth conclusively not only in time and labor saved and greater cleanliness, but also in its beneficial influence upon the health and happiness of workers.

If you wish to see exactly how the FINNELL System operates, write us, asking our representative to bring his projector to your office and show you our motion picture films.

Free Booklet

"Electrical Scrubbing," a small booklet, will be sent to any executive on request together with our latest broadside containing large pictures and full description of FINNELL equipment in various sizes. Address

AMERICAN SCRUBBING EQUIPMENT SALES CO.
General Offices and Factories
512 COLLIER ST., HANNIBAL, MO.
Power Scrubbing Headquarters for Seventeen Years

FINNELL SYSTEM
OF ELECTRIC SCRUBBING

"Clean Floors Reflect Clean Business"

The Electrical Equipment for that New Mill!

IN planning that new mill or addition, one of the most important things to consider is the electrical system. It may represent not only a big investment in initial equipment, but future dependability and economy of the system must be assured to begin with.

Obviously, it is an item that should not be left to ordinary electrical contractors who have not had long experience in textile mill electrical systems.

The entire system can be turned over to H. & G. engineers with the assurance that their knowledge of equipment will insure the utmost economy in initial investment, and their long years of experience in planning and installing textile mill electrical systems will insure a system that will be a permanent investment.

Call us when you're ready

HUNTINGTON & GUERRY, INCORPORATED
GREENVILLE, S. C.

HUNTINGTON & GUERRY TROUBLE PROOF ELECTRICAL INSTALLATIONS

H & G TROUBLE-PROOF ELECTRICAL INSTALLATIONS

Electrical Service to Georgia

On General Electric Products

Our Atlanta and Savannah warehouses carry complete lines. Whatever your requirements — just so they are electrical— we can not only fill them, but insure prompt and efficient shipments.

We carry a particularly full line of textile mill equipment, illuminating units, lamps, motors, etc. Save yourself worry and inconvenience by drawing from our complete stock.

COMPLETE LINES OF

Wire
Conduit
Switches
Safety Devices
Fuses
Insulators
Lamps
Lighting Units
Fixtures
Fans
Street Lights
Motors
Brushes
Etc.
Anything Electrical

QUICK DELIVERY

CARTER ELECTRIC CO.

Distributors

ATLANTA SAVANNAH

ELECTRICAL SUPPLIES

GENERAL ELECTRIC CO.'S PRODUCTS—MOTORS, WIRE, WIRING DEVICES, ELECTRICAL, PORCELAIN CONDUIT AND FITTINGS, TRUMBULL SWITCHES.

Complete Stocks in Columbia for Prompt Shipment.

DISTRIBUTING JOBBER

PERRY-MANN ELECTRIC COMPANY

COLUMBIA, S. C.

TUPELO

For TEXTILE MILL FLOORS especially, this "Hard-Wear" Lumber makes good always---and in

ALL-WAYS

Wheels and heels have the effect of making it smoother and solider and denser. That's "some" merit.

Get the complete facts about TUPELO before placing an order for Flooring for any use. They're interesting and convincing. Write.

Southern Cypress Manufacturers' Association

805 Poydras Building, New Orleans, La., or
805 Graham Building, Jacksonville, Fla.

TUPELO

COTTON MILL BUILDINGS

INDUSTRIAL BUILDINGS

A. K. ADAMS & CO.

CONTRACTING ENGINEERS
BUILDERS

ATLANTA, : GA.

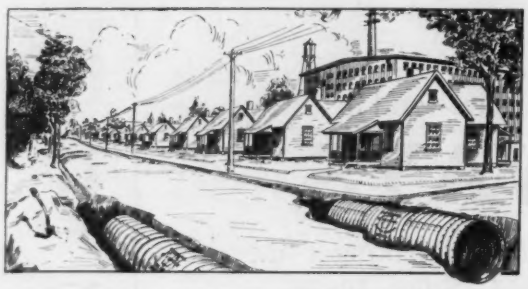
Specializing in Cotton Mill Construction

Recent Contracts:
CANTON COTTON MILLS, CANTON, GA.
G. E. BLANK, Engineer
WALTON COTTON MILLS, MONROE, GA.
LOCKWOOD, GREENE & CO., Engineers

REINFORCED CONCRETE

PERSONAL SUPERVISION

PROPER DRAINAGE IS VERY NECESSARY



The men who build good roads use Carolina Metal Culverts.

They have used Carolina Culverts in the past, and are using them with efficiency today.

Long experience has taught them that a good road, that does not stay good—is a poor road, and very costly.

To prevent your money from a pile of rust, and decay—install Carolina Metal Culverts. They are of the best Copper Bearing Metal. Anti-Corrosive, Rust Resisting, and comply with the specifications of the State Highway Commission, and the United States Government. Carolina Metal Culverts COST LESS than other types of drainage, easy to install, can be removed or relaid without damage, and are indestructible.

That's why you find them installed in so many Mill Villages, under road-ways, streets, and in all places where drainage is necessary.

Carolina Metal Culvert Company

Office and Works

SALISBURY, NORTH CAROLINA

SPECIFY AND USE

Royal Cement

Manufactured by the wet process, insuring absolute uniformity. Tested in our laboratory once every sixty minutes.

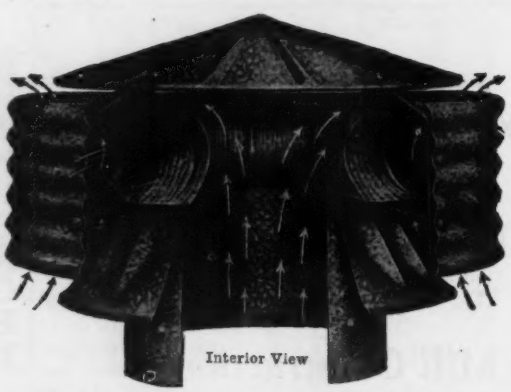
Used in the largest construction jobs in the South.

300,000	Bbls.	in	Power	Dam,	Ladds, Tenn.
150,000	"	"	"	"	Ocoee, Tenn.
500,000	"	"	"	"	Alcoa, Tenn.
75,000	"	"	"	"	Bayview, Ala.

Dixie Portland Cement Co.

Chattanooga, Tennessee

Brings The Out-Doors In



Interior View

DIXIE VENTILATORS

keep fresh air constantly circulating through your rooms, your office or your factory.
Foul, warm air will always rise through a ventilator, but the DIXIE does not merely afford a passage through which it may pass—IT FORCES THE AIR OUT.
It works all the time, without rest. It costs not a single cent to operate it. It means greater working capacity for everyone in the building.
And it costs no more than other ventilators.

Write for full particulars, sizes, prices, etc.

Bowman-Dozier Mfg. Co.

Manufacturers—Contractors—Sheet Metal Workers

ATLANTA, GA., U. S. A.

"Dixie's Reliable Roofers"

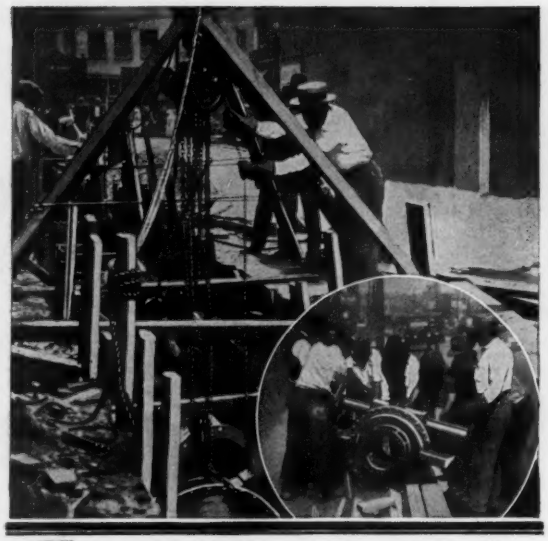
WE not only supply the best material but see that it is applied in the most efficient manner possible to render the longest wearing and most satisfactory and economical roof.

For 43 years the name MURPHY has been synonymous with high class roofing material and expert work. This reputation must be upheld and in selecting MURPHY for your roofing work you are assured of a personal service that you cannot secure elsewhere.

We can furnish or install any class of roofing desired—GRAVEL, TAR, FELT, COMPOSITION, ETC.

C. P. MURPHY'S SONS

ESTABLISHED 42 YEARS ATLANTA, GA.



CYCLONE HIGH SPEED HOISTS

We Saw this Example of Labor Saving From Our Office Window!

IT took nine husky men, with many a "yo" and a heave, to place this ponderous fitting in position for lowering into a trench dug by the Cleveland Electric Illuminating Co. for laying the steam pipes to the new Union Trust Building, Cleveland.

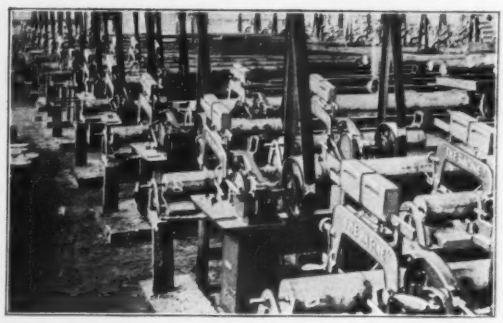
When hooked to the Cyclone Hoist, rigged over the trench, one man alone lowered the same heavy weight into position!

One never need go far to find places where a Cyclone Hoist can save labor and cut costs. Perhaps *you* need only look out *your* window into your factory yard, your shop or warehouse to see instances where a Cyclone Hoist can profitably replace muscle-methods. Look!

Send for catalog covering 1 to 40 Ton Hoists Cranes, Trolleys and Overhead Track Systems.

DISTRIBUTORS EVERYWHERE

The Chisholm-Moore Mfg. Co.
Cleveland, O.
Hoists Cranes Trolleys
Overhead Track Systems
Branches: **New York, Chicago, Pittsburgh**



You Want SPEED in Metal Cutting

In a large centralized cutting department like the one above—in single scattered units—wherever you want metal cut, it is faster to

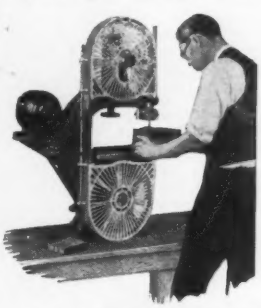
Use a

RACINE HIGH SPEED METAL CUTTING MACHINE

Sizes to fit every job.

A "Racine," or a battery of "Racines" will cut cutting costs in your plant. They waste less metal, save blades and reduce the work of finishing. Where cutting work is scattered among different departments, the units may be placed where the work is done so there are no wasted steps. Let us help you check up on your work and show you how to cut costs.

Write for our bulletins and a sample cut from six-inch stock.



RACINE DUPLEX BAND SAW

Like all "Racine" Cutting Machines, this saw is designed to do cutting where the work needs to be done. Ruggedly built to do the most accurate work. Speeds suitable for all materials, wood, soft metal or steel. A great time saver for assembling departments. Complete bulletin on request.

Use "Racine" H. S. Wood and Metal Band Saw Blades and "Racine" H. S. Tungsten Power and Hand Hack Saw Blades.

RACINE TOOL & MACHINE CO.

1309 Jones Ave., Racine, Wis.

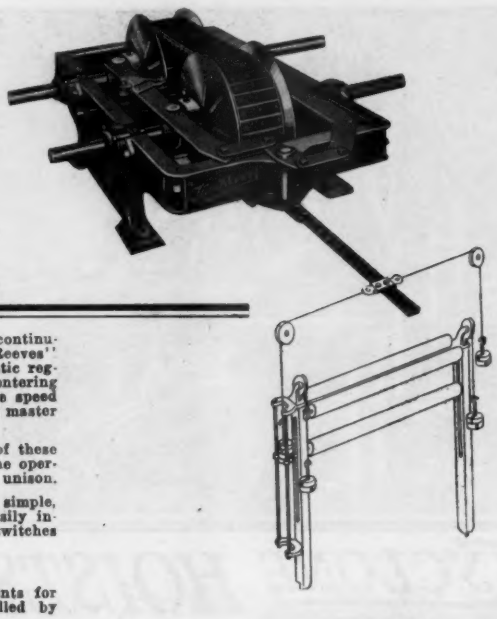
Manufacturers of the

Famous Racine H. S. Metal Cutting Machines

"STANDARD THE WORLD OVER"

"The Reeves" VARIABLE SPEED TRANSMISSION

AUTOMATIC CONTROL



A complete innovation in connection with the continuous process of manufacturing cloth, is "The Reeves" Automatic Control, by which an entirely automatic regulation is obtained on water mangles, dryers, tentering frames and winders. It automatically keeps the speed of all machines running in exact unison with the master machine.

It eliminates the changing by hand the speed of these various machines, thus saving the services of the operator, formerly employed to keep them running in unison.

"The Reeves" Automatic Control is extremely simple, durable and reliable. Very inexpensive and easily installed. No electrical apparatus or complicated switches to get out of order.

It is to your interest to investigate now.

Over 95% of the world's industrial requirements for mechanical variable speed control are now filled by "The Reeves" Variable Speed Transmission.

Write for Automatic Control Bulletin, C-2055.

REEVES PULLEY COMPANY COLUMBUS, INDIANA

Save Man Power

THE time and money that is being lost every day because of inefficient material handling methods will quickly repay the cost of an electric hoist. An Euclid Electric Hoist or Crane operated by one man can do more work than ten men w th a chain block or hand crane. It will save time, preventing men and machines standing idle, save man power, and increase production.

Ask for the catalog showing the styles and types for textile mill use. The Eucid is the most dependable and efficient type of hoist made.

EUCLID CRANE & HOIST CO.,
EUCLID, OHIO

EUCLID CRANES AND HOISTS

BETTER NON-FLUID OIL LUBRICATION

AN OUNCE OF PREVENTION
Saves a Lot of Work

TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE

Modern Textile Lubricant

is the trouble preventive in Textile Mills —it stays in the bearings and off the goods.

This saves unnecessary work for the worker and saves the company's money. NOTE:—NON-FLUID OIL not only avoids stains but lasts so much longer per application that it **costs less per month for better lubrication.**

Write for free sample and latest "Bulletin"

New York & New Jersey Lubricant Co.
401 Broadway New York
Southern Agent, L. W. Thomason, Charlotte, N. C.
Ample Stocks at Our Branches
Charlotte, N. C. Greenville, S. C.
Atlanta, Ga. New Orleans, La.

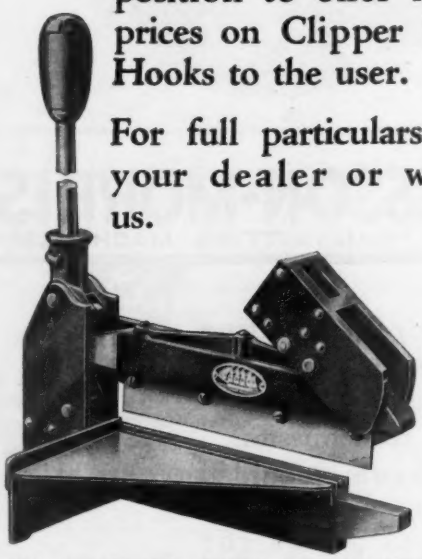
AT LESS COST PER MONTH

ANNOUNCEMENT

Greatly Reduced Prices on Clipper BELT HOOKS

Through increased production over a period of years our volume of business has grown to the extent that we are now in a position to offer lower prices on Clipper Belt Hooks to the user.

For full particulars ask your dealer or write us.



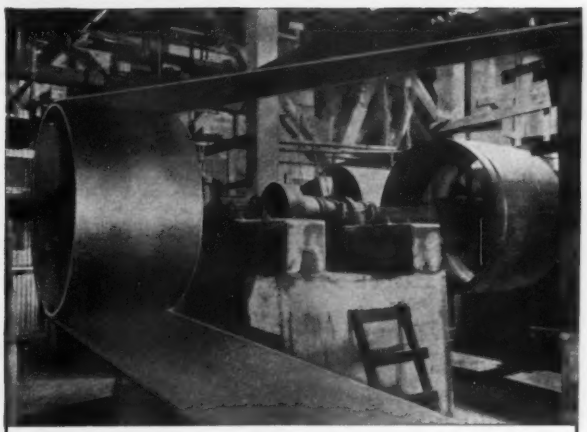
CLIPPER BELT CUTTER
MADE IN OPEN AND CLOSED MODELS

For cutting belting from the roll and for squaring or trimming belts up to 6 inches in width. Immediate delivery. —Any quantity.

Safety Feature: The knife *cannot be raised high enough* to become a *hazard.*

Descriptive literature mailed on request.

Clipper Belt Laeer Company
Grand Rapids, Mich.



After Thirteen Years

THIRTEEN years ago," writes a western man, "you sold us a belt for a drive in our mill and it has been on the job ever since. Without doubt this is the best belt we have ever had, as it is used on the hardest drive in the mill.

"It has, however, finally given out and we would like to have your quotation on a new belt of the same quality."

There are many reasons why Graton & Knight Belts acquire the reputation of being the "best in the mill." This belt lasted thirteen years because it was *right*—it was made of good, honest, rugged leather, of the quality, weight and flexibility for that particular drive.

The Graton & Knight Standardized Series—the result of years of study of power transmission requirements and conditions—is composed of belts that are scientifically right for the duty for which they were designed. There is one to meet every belting requirement no matter what your business may be.

Send for the book "The Standardization of Belting." It tells the whole story of the Graton & Knight Standardized Series. A Graton & Knight engineer will gladly call on you and discuss your power transmission problems. Many plants ask us to specify the belting for every pulley. Our experience is at your disposal. The acceptance of it will put you under no obligation.

GRATON & KNIGHT
WORCESTER, MASS.

GRATON & KNIGHT

Nothing takes the place of Leather

100 INCHES OF BELT

can be laced with one box of

BRISTOL'S

Patent Steel Belt Lacing

A HAMMER is the only tool necessary—you already have that.

Saves time—saves money—always ready.

Have you seen Bulletin J-713?

THE BRISTOL COMPANY

WATERBURY, CONN.

Boston New York Philadelphia Pittsburgh
Detroit Chicago St. Louis San Francisco

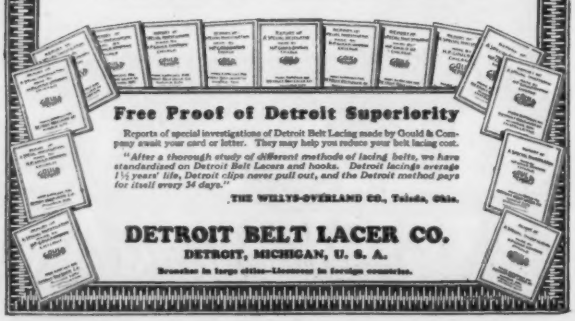
"DETROIT" BELT LACING is Still The Cheapest By Far

Ask any of our 18,000 users. Another important fact to remember is that

"DETROIT"

IS the only Wire Hook Belt Lacing that takes a staggered grip on the Belt.

Let us prove it by sending X-Ray photographs, they tell the inside story.



Free Proof of Detroit Superiority

Reports of special investigations of Detroit Belt Lacing made by Gould & Company await your card or letter. They may help you reduce your belt lacing cost.

"After a thorough study of different methods of lacing belts, we have standardized on Detroit Belt Lacers and hooks. Detroit lacings average 1½ years' life, Detroit clips never pull out, and the Detroit method pays for itself every 34 days."

THE WILLYS-OVERLAND CO., Toledo, Ohio.

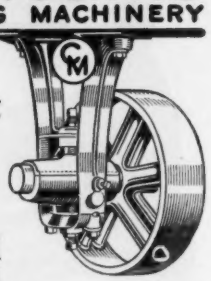
DETROIT BELT LACER CO.

DETROIT, MICHIGAN, U. S. A.

Branches in large cities—Licensees in foreign countries.

CRESSON-MORRIS

POWER TRANSMITTING MACHINERY



Power transmitting machinery
Shafting
Rope transmission
Machine moulded and cut iron and steel gears for heavy service.
Complete plant equipment.
Engineers; founders; machinists.
Sugar centrifugals.

CRESSON-MORRIS CO.

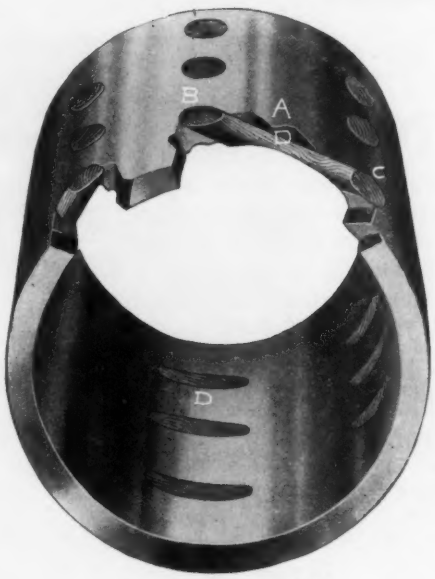
18th Street and Allegheny Ave.
PHILADELPHIA, PENNSYLVANIA

2189-X

Sixty Years Experience as Engineers·Founders·Machinists

The Moccasin Bushing

USES LESS OIL —AND USES IT ALL!



(Patented October 6, 1914)

The Wood Feeders carry the Oil through the Bushing to the Bearing Surface

It—

Only requires oiling a few times a year.
Prevents waste of oil.
Prevents oil damage to floors, belts and stock
Filters oil to the bearings.
Keeps things clean.
Lasts indefinitely.

One of the hundreds of testimonials we have received:

HOME COTTON MILLS

Branch of Bemis Bro. Bag Co.

All of our loose pulleys in the spinning room are equipped with Moccasin Bushings. We are well pleased with the results we are getting from the use of this bushing as they have entirely eliminated the hot pulley, reduced the consumption of oil, and, we believe, have cut down our consumption of belting in the spinning room fully 40%.

Write for literature and full information.

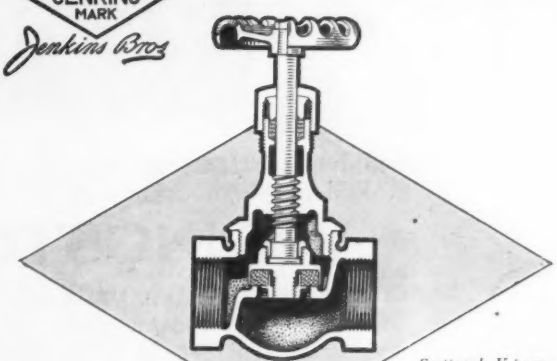
Moccasin Bushing Company

Chattanooga, Tenn.

Made for maximum service not merely the average

TRADE JENKINS MARK

Jenkins Bros



Sectional View, Fig 106, Screwed, Standard Bronze Globe Valve

Standardization will lower your maintenance cost

Standard Bronze Angle Valve

Standard Bronze Swing Check Valve.

Standard Bronze Globe Valve.

Those who use Jenkins Valves know they give good service—and that they are easily maintained in perfect working order with very little attention. Their dependable service even when subjected to the most severe conditions and freedom from costly repairs, and replacements, make Jenkins Valves very economical valves to use.

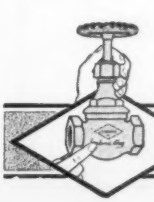
In other words, each Jenkins Valve represents a definite yearly saving to you. Multiply this sum by the number of valves in your plant, and you obtain a total saving well worth considering when buying valves.

It will pay you to standardize on Jenkins Valves throughout your plant. You will obtain positive valve service at lower maintenance cost.

Valves in bronze, iron and steel for all mill requirements. At supply houses everywhere.

JENKINS BROS.

80 White Street.....New York, N. Y.
524 Atlantic Avenue.....Boston, Mass.
133 So. Seventh Street..Philadelphia, Pa.
646 Washington Boulevard—Chicago, Ill.



Always marked with the "Diamond"

Jenkins Valves

SINCE 1864

YOUNGSTOWN

Builders of Heating, Humidifying and Power systems have installed many thousands of tons of

YOUNGSTOWN PIPE

in the great cotton mills of the South. These firms chose "Youngstown" because they had the facilities and knowledge necessary to select the best. The high reputation of their product is in part due to the use of the best pipe that could be secured. You may not be able to discriminate as these manufacturers do, for all pipe looks pretty much alike; but you can at least follow their example and be assured the best that is to be had.

THE YOUNGSTOWN SHEET & TUBE CO.

YOUNGSTOWN, OHIO

DISTRICT SALES OFFICES:

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DETROIT—2021-22 First National Bank Bldg.
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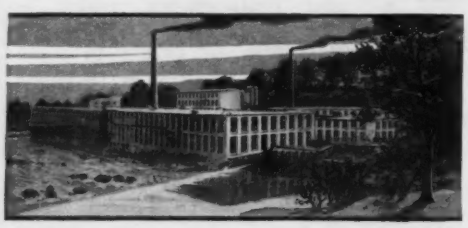
SAN FRANCISCO—704 Mission St.
SEATTLE—Central Bldg.
NEW ORLEANS—Maison-Blanche Bldg. Annex.
KANSAS CITY, MO.—1301 Commerce Bldg.



RHOADS BELTS FOR COTTON MILLS

IT is service that you buy when you buy Rhoads Belts. Here is our guarantee. It's a service guarantee:—

"If a Rhoads Belt does not show you a lower cost per year than other belts, when you consider length of life, reduction of repairs and take-ups and increased output, send it back to us and we will refund whatever part of the purchase price you claim is right."

This guarantee emphasizes the distinctive points that make Rhoads Belts the long lasting, strong gripping, economical belts that they are.

J. E. RHOADS AND SONS

PHILADELPHIA: 29 N. SIXTH ST.
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CHICAGO: 316 RANDOLPH ST.
FACTORY AND TANNERY: WILMINGTON, DEL.
OUR NEW STORE:
ATLANTA, GA., 68 S. FORSYTH ST.

Uneven Laps

Cause uneven work. Slipping evener cone belts cause uneven laps. Friction in the apron and evener rolls makes the cone belt slip.

Ball bearings remove this friction and allow the cone belt to give the proper feed of cotton to the beater.

The installation is not expensive and is used on hundreds of lappers.

AldricH MachinE

Ball WorkS Bearings

Greenwood, S. C.

Would You Pay A Dollar A Pint For Water?

You may be doing it unknowingly—that and more. If you are permitting condensation to collect in your slashers, dryers, dry cans and service heaters water is costing you good money by cutting into your profits.

Condensation retards steam circulation, cools your machines and reduces your output. It may be dividing your profits in half.

Drainage with a Morehead Back-to-Boiler System will do away with this loss. A Morehead System will drain every drop of condensation as it forms, leaving your steam lines, spaces and coils open for free circulation. The interior sufraces will stay dry and transmit the largest possible amount of heat. The Morehead System will feed the condensation to the boilers—without pumps—at the temperature of condensation.

In hundreds of mills Morehead Systems have increased production or lowered fuel bills and made possible bigger profits. One will do the same for you. Write for proof.

MOREHEAD MANUFACTURING CO.
DEPT. C, DETROIT, MICHIGAN

(121)

Morehead

"BACK – TO – BOILER – SYSTEM"

POSITIVELY DRAINS ALL TYPES OF STEAM APPARATUS. DELIVERS CONDENSATION AND FEED WATER TO BOILERS UNDER ALL CONDITIONS AT MAXIMUM TEMPERATURE

ANNOUNCEMENT

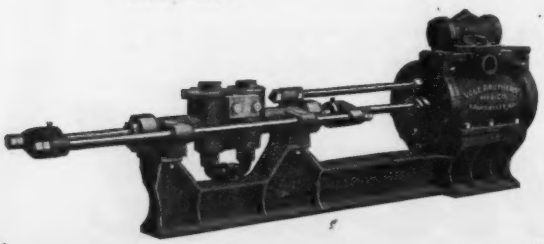
The Hazle Brook Coal Company, the Stonega Coke and Coal Company and the Wentz Company have bought all of the stock of the GENERAL COAL COMPANY, a Delaware Corporation, and after January first, Nineteen Twenty-Four, will operate it under their management.

The GENERAL COAL COMPANY will conduct the business formerly transacted by the Wentz Company, and will be the exclusive sales agent for "ADMIRALTY," "RODA" and "STONEGA" coal and coke produced by the Stonega Coke and Coal Company, and for the "DEPENDABLE" Anthracite Coal produced by the Hazle Brook Coal Company.

REILLY PUMPS

Hydraulic Type

"Good Pumps since 1891"



VAGT BRATHERS MFG. CO.
(NATIONAL FOUNDRY & MACHINE CO.)
INCORPORATED
LOUISVILLE. KENTUCKY.

How Much Would You Save?

clearing fog and stopping roof drip in a 90 jig bleaching, dyeing and finishing plant with

"Buffalo" Equipment:

1. Saved cloth enough to more than pay for Buffalo Equipment every three years.
2. Increased useful life of pulleys, shafting and machinery.
3. Doubled life of three $4,000 roofs.
4. Boosted production thru better vision.
5. Brought increased business from better satisfied customers.

The name of this plant will be supplied on request and a non-obligating solution of your problem will be sent. Address Dept. No. 97.

Buffalo Forge Company

188 Mortimer St. Buffalo, N. Y.

Valves that stand for service and satisfaction.
Small or large, for low or high pressures or temperatures, of Bronze, Iron Body Bronze Mounted, Steel Mound Mounted, or of All Iron for handling fluids which attack bronze alloys, a design particularly adapted for the purpose can be found in the comprehensive line of LUNKENHEIMER GLOBE AND ANGLE VALVES.
The completeness of the line makes possible standardizing on Lunkenheimer Valves with that resultant prolonged satisfactory service and economy of maintenance provided only by the Lunkenheimer method of manufacture.
For complete information write for a copy of Catalog 58.
THE LUNKENHEIMER CO.
CINCINNATI, U.S.A.

1300-24-10

BOILERS

of the

Water Tube and Tubular Types

OUR SPECIALTY

WALSH & WEIDNER BOILERS with our improved Steel Casing make the ideal Steam Plant. The cost of installation is moderate, the plant looks neat, cost of repairs is slight and they will save from 10 to 25% of your fuel bill.

We also manufacture Tanks of all description, Towers and Tanks, Steel Stacks, Steel Breeching, Smokestacks, Structural Steel and Plate Steel Work.

Write for our new catalog.

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For Particular Purposes

Spun by

The Arrow Mills, Inc.

This plant runs largely on cotton yarns required for special usage in our customers mills—not the ordinary run of yarn but a fine combed product, spun of choice long staple white cotton in sizes ranging from 36s to 60s single and ply.

Quotations and samples promptly submitted

H. A. FLORSHEIM, General Sales Manager

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LINEN YARNS

For Weaving, Knitting and all Purposes.

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To Our Many Friends and Customers

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WOODWARD, BALDWIN & CO.

43 and 45 Worth Street, New York

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SOUTHERN COTTON MILLS

Manufacturing Well Known Brands of

SHEETINGS *SHIRTINGS*
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St. Joseph
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San Francisco
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Shanghai, China

The William Whitman Company, Inc., has an office in Charlotte, North Carolina, for the purpose of rendering prompt service to its customers in the South for cotton, worsted, and worsted merino yarns, and, at the same time, of keeping in close touch with the Southern yarn mills whose product it sells.

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Commercial National Bank Building
CHARLOTTE, N. C.

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Columbus Mfg. Co., Columbus, Ga.
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For a quarter of a century we have been spinning good cotton yarns whose strength, uniformity, cleanliness and better weaving qualities can be vouched for by some of the country's best known manufacturers of textile products.

26 to 40s Carded — *Skeins, Warps*
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NOW RENTING IN
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CARVER-BEAVER YARN CO.
Successors to A. D. SALKELD & BRO., Inc.
ALL NUMBERS COTTON MERINO **YARNS** ALL COLORS WOOL WORSTED
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STENCILS FOR COTTON SHIPPERS, COTTON MILLS MERCHANTS & MANUFACTURERS - ALSO BRUSHES, INK, MARKING POTS
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of all descriptions for weaving and knitting.

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Hosiery Yarns 20s to 30s on cones

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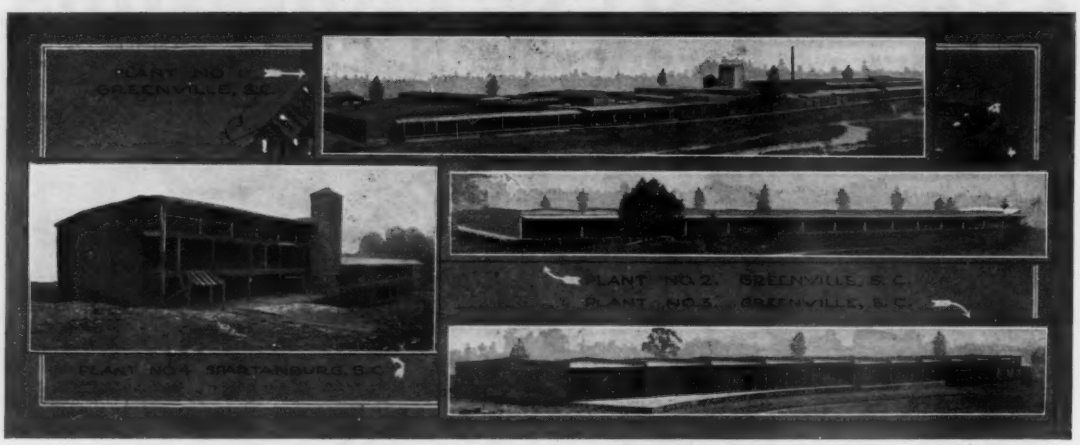
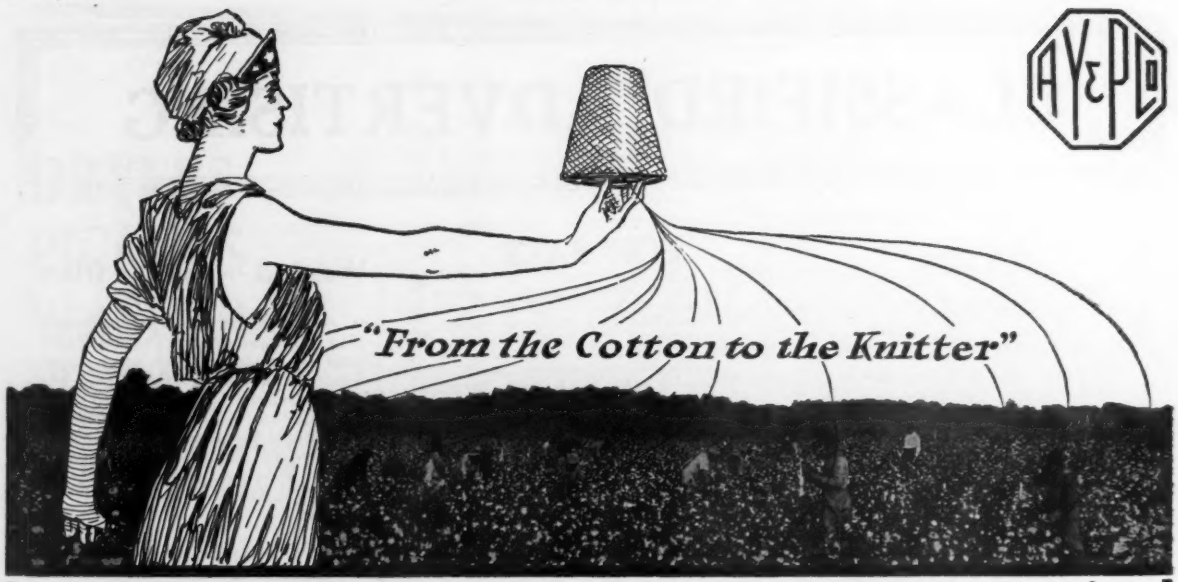
Piedmont Bonded Warehouse & Compress Co., Inc.

Capital $500,000. — Capacity 100,000 Bales



OVER 500,000 bales of cotton are consumed annually within a radius of 50 miles of this Warehouse.
Situated in the midst of the great Cotton Manufacturing district of the Carolinas.
Facilities for distributing Mill Cotton are unsurpassed.
Have re-shipping facilities without additional cost, from all points throughout the Cotton States South and West of Atlanta, Georgia.
Its receipts are well and favorably known to all Southern, Eastern and Western Banks.
Warehouses are protected with Sprinkler System, which guarantees best insurance rates.
Our rates for services rendered patrons are reasonable.
For further information, apply to

C. T. TURNER, Manager, Greenville, S. C.



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AMERICAN YARN & PROCESSING CO.

MOUNT HOLLY, N. C.

SPINNERS AND MERCERIZERS

HIGH GRADE COMBED AND CARDED YARNS—16s to 80s

Our Mercerized Yarns Are the Product of Our Own Mills

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"For Sale" and all other advertisements using bold face type or otherwise displayed, $2.00 per inch per insertion.

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"Positions Wanted" 3 cents per word per insertion. Minimum charge 50 cents. Payable in advance.

"Positions Open" and other undisplayed advertisements, 4 cents per word per insertion. Minimum charge $1.00. Payable in advance.

(*When replies are to be received in our care, allow four words for box address,*)

FOR SALE

1—Pratt & Whitney 18 x 6 Quick Change Lathe.
1—Springfield 18 x 10 Quick Change Lathe.
1—Le Blond Heavy Duty 24 x 14 Lathe with raising block to 30".
1—Hendey Lathe 16 x 6 Quick Change.
1—Hendey 20" Shaper.
2—12" Grinder Stands.

All machines in first-class condition with regular equipment.

L. A. McFarland
GASTONIA, N. C.

Wanted—Young Man

as Assistant in Power Department of a large Southern Textile Plant; must be educated, with some experience in this work. Man who has been working in small plant who has ambition to connect with larger plant might be acceptable. In replying, give age, experience, and references. Address, Box 101, care of COTTON, Grant Building, Atlanta, Georgia .

WANTED

To get in touch with a small mill in run down condition, one where production is low and seconds high. By a practical man with long experience and best of references.
Address Box 104, care COTTON, Grant Bldg., Atlanta, Ga.

Position Wanted

Superintendent with several years' experience on Tire Fabrics, desires to connect with Southern mill. Has been in one place for past eleven years and is familiar with requirements of all leading tire makers. Address Box 103, care of COTTON, Grant Bldg., Atlanta, Ga.

New and Second Hand

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Corliss Automatic and Slide Valve

BOILERS

Pumps, Hoisting Engines, Gas and Gasoline Engines.

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Lathes, Planers, Shapers, Drill Presses, etc.

WOOD WORKING

Planers, Molders, Band Saws, etc.

ELEC. MACHINERY

Dynamos and Motors

AND SUPPLIES OF ALL KINDS

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127-31 N. Third St.,
Philadelphia, - Pennsylvania

Do You Want to Sell It?

Probably you, like many other mills, have some equipment which you have taken out, or are thinking of taking out and replacing with new equipment.

Why not dispose of this second-hand equipment at a profit? COTTON is read by thousands of Cotton Mills that are hardly touched by Northern journals.

You Can Sell Your Second-Hand Equipment

to these mills through advertising in the Classified Advertising Section of COTTON. Such advertising produces results at small cost—why not try it out and get that second-hand equipment off your hands in a profitable way? Tell us what you have for sale and let us insert an advertisement for you.

COTTON

GRANT BUILDING ATLANTA, GA.

DRYERS
PICKERS
WASHERS
FEEDERS
WRINGERS

COTTON LINTERS were used in enormous quantities at the Old Hickory Powder Plant during the World War, and the best of equipment was used in the washing, picking, drying, and pulping processes.

MORE THAN ONE cotton mill has saved money on installations by buying some of the surplus cotton-conditioning machinery made available when the manufacture of powder ceased. There is a great deal of this equipment still on hand, and it is being offered at attractive prices.

COTTON DRYERS. Sargent No. 24 six-section 8 foot Cotton Dryers. Overall dimensions 99 ft. 4 in. long, 15 ft. 5 in. wide, 7 ft. 10 in. high. Equipped with Model "M" self feeder. Hot air drawn through belt by 33 in. exhaust fans. Constructed throughout of metal angles and plates. These are large dryers, but at small expense they can be cut down to fit a smaller need, as they are of a sectional type.

MIXING PICKERS. Sargent Cylindrical type 48 in. mixing Pickers, equipped with single pair fluted feed rolls, 3½ in. diameter. Cylinder provided with 6 heavy steel bars on lugs bolted to spider. Capacity 600 to 800 lbs. per hour.

COTTON WASHERS. Sargent 48 in. Special Cotton Washers or Rinsers. Complete with cast iron frames, pans, squeeze rolls, kicker and conveyor.

FEEDERS. Sargent 48" Model "M" Feeders for Sargent Dryers.

CONCENTRATORS. Noble & Wood Concentrators, right and left hand cylinder washers with octagon cylinder, diameter 44 in. length 42 in. Rotates at 6 R.P.M. Vat is 4 ft. 1½ in. wide, 6 ft. 9 in. long, 2 ft. 9 in. high.

WRINGERS. 42 in. American Tool and Machine Company Centrifugal Wringers. Complete with 42 in. perforated steel basket shell, with steel top. Basket 22½ in. inside depth, ⅜ in. steel. Wringers direct connected to 40 H.P. Motors.

36 in. American Tool and Machine Company Belt Driven Centrifugal Wringers. In sets arranged in batteries of three.

Let us furnish prices and specifications on material that interests you.

OTHER EQUIPMENT of value to mills includes 823 H.P. Stirling boilers, steel tanks of all sizes, scales, motors, welded steel digesters, forced draft fans, 350 H.P. Corliss engines, Valves and fittings, transmission of all kinds.

OLD HICKORY POWDER PLANT

OLD HICKORY, TENNESSEE

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Buckeye Blower Co.
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AIR CONDITIONING SYSTEMS
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ALUM.
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(See Loom Attachments.)

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BELTING (ROUND—LEATHER).
Bond Co., Chas.
Graton & Knight Mfg. Co.
Rhoads & Sons, J. E.

BELTING—ROPE.
(See Rope Transmission.)

BELT CONVEYORS.
Dodge Mfg. Co.
Fulton Supply Co.
Link-Belt Company.
Morse Chain Co.

BELT DRESSING.
Bond Co., Chas.
Dixon Crucible Co., Jos.
Fulton Bag & Cotton Mills.
Graton & Knight Mfg. Co.
Rhoads & Sons, J. E.
Williams & Sons, I. B.

BELT FASTENERS.
Bristol Co.
Clipper Belt Lacer Co.
Detroit Belt Lacer Co.
Flexible Steel Lacing Co.
Fulton Supply Co.

BELT LACING (LEATHER).
Bond Co., Chas.
Dodge Mfg. Co.
Fulton Supply Co.
Graton & Knight Mfg. Co.
Rhoads & Sons, J. B.
Williams & Sons, I. B.

BELT TIGHTENERS.
Dodge Mfg. Co.
Fulton Supply Co.
Link-Belt Company.
Rhoads & Son, J. E.
Wood's Sons Co., T. B.

BELT TIGHTENER DEVICE FOR CONE PICKERS.
Bahan Textile Mch. Co.

BENCHES MECHANICS' CLOTH INJECTORS, ETC.
Allen Co.
Lupton's Sons Co., David.

BENCH DRAWERS.
Lupton's Sons Co., David.

BENCH LEGS (PRESSED STEEL).
Lupton's Sons Co., David.

BENCHES (PARK AND PLAYGROUND).
(See Playground Equipment.)

BINS (METAL).
Mills Co.

BLEACHERIES.
(See Dyers, Bleachers and Finishers.)

BLEACHING KIERS.
Butterworth & Sons Co., H. W.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Textile Finishing Machry. Co.
Woolford Wood Tank Co., G.

BLEACHING MACHINERY.
(See Dyeing, Bleaching and Finishing Machinery.)

BLEACHING, FINISHING AND SIZING MATERIALS.
(See Finishing Materials.)

BLOWERS AND BLOWER SYSTEMS.
American Blower Co.
Buckeye Blower Co.
Buffalo Forge Co.
Carrier Eng. Corp.
General Electric Co.
Philadelphia Drying Mchry. Co.
Westinghouse Elec. & Mfg. Co.

BLOWPIPES (BRAZING, CUTTING, WELDING).
Oxweld Acetylene Co.

BOARDS (FILLNG).
Davis Mfg. Co., Frank.

BOARDS—FIBRE.
Standard Fibre Co.

BOARDS—FORM.
Pearson, Jos. T.

BOBBINS.
Brown Co., David.
Draper Corporation.
Fulton Supply Co.
Jordan Mfg. Co.
Lestershire Spool & Bobbin Co.
Parker Co., Walter L.
Shambow Shuttle Co.
U S Bobbin & Shuttle Co.
Whitin Machine Works.

BOBBIN HEADS.
Brown Co., David.
Jordan Mfg. Co.
U S Bobbin & Shuttle Co.

BOBBIN STRIPPERS.
Crompton & Knowles Loom Works.
Terrell Machine Co.

BOILERS.
Cole Mfg. Co., R. D.
International Engineering Wks., Inc.
Lombard Iron Works & Supply Co.
Old Hickory Powder Plant.
Toomey, Frank.
Walsh & Weidner Boiler Co.

BOILER COMPOUNDS.
Dixon Crucible Co., Jos.

BOILER FEED WATER PURIFICATION.
American Water Softener Co.
Hungerford & Terry, Inc.

BOILER ROOM FITTINGS AND SUPPLIES.
American Blower Co.
Bristol Co.
Crane Co.
Dixon Crucible Co., Jos.
Fulton Supply Co.
International Engineering Co.
Jenkins Bros.
Lunkenheimer Co.
Old Hickory Powder Plant.

BOILER GRATES AND STOKERS.
(See Grates and Stokers.)

BOILER TUBES AND FITTINGS.
Ryerson & Son, Inc., Jos. T.

BOLTS AND NUTS.
Ryerson & Son, Inc., Jos. T.

BONDS AND STOCKS (TEXTILE MILL).
American Trust Co.

BOX STRAPPING AND TIE BUCKLES.
(See Banding Straps and Buckles.)

BOXES—MILL.
Allen Co.
Morris & Co., Inc.
Smith Mfg. Co.
Standard Fibre Co.

BOXES—PACKING.
(See Packing Boxes.)

BRAID.
(See Tapes.)

BRAZING.
(See Welding.)

BRICK (BUILDING & PAVING).
National Paving Brick Mfg. Asso.

BROKERS—COTTON.
(See Cotton Dealers & Brokers.)

BROKERS—STOCK.
(See Stocks and Bonds.)

BROOMS.
(See Brushes.)

BRUSHES—MILL.
Atlanta Brush Co.
Mason Brush Wks.

BRUSHES—MOTOR AND GENERATOR (COMMUTATOR).
Dixon Crucible Co., Jos.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

BUCKETS AND PAILS—MILL.
Morris & Co., Inc.
Smith Mfg. Co.
Standard Fibre Co.

BUCKETS—ELEVATOR AND GRAB.
Link-Belt Company.

BUCKLES—COTTON TIE.
(See Box Strapping and Ties.)

BUILDING CONTRACTORS.
(See Contractors.)

BUILDINGS (PORTABLE STEEL).
Dowman, George.
Dowman-Dozier Mfg. Co.

BUILDINGS (READY BUILT).
Minter Homes Co.

BUILDINGS (ALL STEEL).
Dowman, George.
Truscon Steel Co.
Maryland Metal Building Co.

BUILDING MATERIAL.
Anchor Post Iron Works.
Birmingham Slag Co.
Bogart & Carlough Co.
Callahan Co., T. J.
Detroit Graphite Co.
DeVilbiss Mfg. Co.
Dixie Portland Cement Co.
Dowman-Dozier Mfg. Co.
Dowman, George.
Dufur & Co.
Kirkpatrick Lumber & Timber Co.
Lupton's Sons Co., David.
Maryland Metal Building Co.
Minter Homes Co.
Murphy's Sons, C. P.
National Paving Brick Mfg. Asso.
Richardson Co.
St. Louis Surfacer & Paint Co.
Sanymetal Products Co.
Sonneborn Sons, Inc., L.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.
Talbert Iron & Steel Co.
Truscon Steel Co.
Variety Fire Door Co.
Wagner Mfg. Co.
Ware Paint Co.

BURR PICKERS.
Proctor & Schwartz, Inc.
Sargent's Sons, C. G.

BUSHINGS.
Moccasin Bushing Co.
Southern Spindle & Flyer Co.

BUSINESS METHODS.
(See Consultants.)

CABINETS.
(See Lockers.)

CALENDERS.
Butterworth & Sons Co., H. W.
Textile Finishing Mchry. Co.

CALENDER ROLLS.
(See Rolls—Calender.)

CALLING SYSTEM—INTER-TELEPHONE.
Carter Electric Co.

CAMPING EQUIPMENT, FURNITURE, STOVES, LIGHTS, ETC.
Smith Mfg. Co.

CANS—ROVING.
Standard Fibre Co.

CANS (DRYING).
(See Drying Equipment.)

CARS AND TRUCKS—FIBRE.
(See Trucks.)

CARDS (BUSINESS OR CALLING—ENGRAVED).
Wiggins Co., John B.

Hard Fibre Roving Trucks

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CARBON BURNING APPARATUS.
Oxweld Acetylene Co.

CARBON RODS AND PASTE (WELDING).
Oxweld Acetylene Co.

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Chemical Textile Engineers, Inc.
Klauder-Weldon Dyeing Machine Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Sargent's Sons & Co., C. G.
Textile Finishing Mchry. Co.
Tolhurt Mch. Works.

CARDING MACHINERY AND SUPPLIES.
Davis & Furber Mch. Co.
Hetherington & Sons, Ltd., John
Howard & Bullough.
Proctor & Schwartz, Inc.
Roy & Son, B. S.
Saco-Lowell Shops.
Southern Spindle & Flyer Co
Whitin Machine Works

CARD AND NAPPER CLOTHING.
Davis & Furber Mch. Co.
Howard Bros. Mfg. Co.

CARD FEEDS.
Davis & Furber Mch. Co.
Hetherington & Sons, Ltd., John
Proctor & Schwartz, Inc.
Schofield Co., Wm.
Whitin Machine Co.

CARD GRINDING MACHINERY.
Proctor & Schwartz, Inc.
Roy & Son, B. S.
Whitin Machine Works.

CARPET MACHINERY.
Butterworth, H. W. & Sons Co.
Crompton & Knowles Loom Works.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Schofield, Wm., Co.
Textile Finishing Mchry. Co.

CARRIER APRONS.
(See Aprons.)

CARRIER SYSTEM.
Euclid Crane & Hoist Co.
Curtis Pneumatic Machry. Co.
Wagner Mfg. Co.

CASES—WOODEN.
(See Packing Cases.)

CASTINGS.
Briggs, Schaffner Co.
Cole Mfg. Co., R. D.
Cresson-Morris Co.
Lombard Fdry. & Mch. Co.
Rome Mach'ne & Fdry. Co.
Walsh & Weidner Boiler Co.

CAUSTIC SODA.
(See Bleaching Materials.)

CEMENT.
Dixie Portland Cement Co.

CEMENT REINFORCEMENT.
Birmingham Slag Co.
Truscon Steel Co.

CEMENT AND BRICK COATING.
American Cement Paint Co.
Detroit Graphite Co.
Dixon Crucible Co., Jos.
Hockaday Co.
Sonneborn Sons, Inc., L.
Wadsworth, Howland & Co., Inc.
Ware Paint Co.

CENTRAL STATION (ELECTRIC).
New Orleans Public Service Co.
Tennessee Electric Power Co.

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Cresson-Morris Co.
Fletcher Works.
Goulds Mfg. Co.
Schaum & Uhlinger.
Tolhurst Mch. Wks.

CHAIN DRIVES.
(See Belting—Chain Link.)

CHAIN—BLOCK, BICYCLE, AUTO, ENGINE, AGRICULTURAL ETC.
Diamond Chain & Mfg. Co.
Fulton Supply Co.
Link Belt Co.
Morse Chain Co.

CHAIRS AND STOOLS.
(See Furniture—Mill.)

CHECK STRAPS.
Bond Co., Chas.
Fulton Supply Co.
Jacobs Mfg. Co., E. H.

CHEMICALS.
(See Dyestuffs and Chemicals.)

CHLORINE GAS.
Electro Bleaching Gas Co.
Mathieson Alkali Works, Inc.

CLEANING MACHINERY (CLOTH AND YARN).
Rome Mch. & Fdry. Co.

CLEANING AND AERATING MACHINE FOR COTTON.
Murray Company, The.

CLEARER CLOTH.
(See Cloth.)

CLOCKS—HANK, ETC.
(See Counters.)

CLOCKS (TIME).
Root Co.

CLOCKS—WATCHMAN.
Foxboro Co., Inc.
Root Co.

CLOSETS—WATER.
(See Toilets.)

CLOTH (ROLLER, CLEARER AND SLASHER).
Best & Co., Edw. H.
Phila. Felt Co.

CLOTH CUTTERS.
Firsching, J. A.
Foster Machine Co.
Wildman Mfg. Co.

CLOTH ROOM MACHINERY.
BButterworth, H. W., & Sons Co.
Davis & Furber Mch. Co.
Firsching, J. A.
Foster Machine Co.
Hopedale Mfg. Co.
Saco-Lowell Shops.
Textile Finishing Mchry. Co.
Williams Co., J. H.
Wildman Mfg. Co.

CLOTH SHRINKING MACHINERY.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Tolhurst Mch. Wks.

CLOTH TESTERS.
Scott Co., Henry L.

CLOTH WINDERS.
(See Winders.)

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Allis-Chalmers Mfg. Co.
Carlyle-Johnson Machine Co.
Cresson-Morris Co.
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Link-Belt Company.

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Stonega Coal & Coke Co.

COAL AND ASH HANDLING MACHINERY.
Link-Belt Company.

COAL TAR DISINFECTANTS.
(See Disinfectants.)

COCKS.
(See Valves.)

COLOR PAILS.
(See Buckets—Mill.)

COMB APRONS.
(See Aprons.)

COMBER AND COMBER SUPPLIES.
Foster Machine Co.
Hetherington & Sons, Ltd., John.
U S Bobbin & Shuttle Co.
Whitin Machine Wks.

COMMISSION MERCHANTS & DEALERS.
(See Cotton Cloth Commission Merchants.)

COMPRESSORS—AIR, GAS, ETC.
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Curtis Pneumatic Mchry. Co.
Fulton Supply Co.
General Electric Co.
Goulds Mfg. Co.

COMMUTATOR BRUSHES.
(See Brushes—Motor and Generator.)

CONCRETE REINFORCEMENT.
Birmingham Slag Co.

CONCRETE REINFORCING STEEL.
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CONDENSERS.
Allis-Chalmers Mfg. Co.

CONDITIONING OVENS (ELECTRIC).
Emerson Apparatus Co.

CONDUITS.
(See Elec. Machinery & Supplies.)

CONE BELT TENSION DEVICE.
Bahan Textile Mch. Co.

CONES (KNITTING YARN).
Foster Mch. Co.
Sonoco Products Co.

CONE WINDING MACHINE.
(See Winding Machinery.)

CONNECTORS—FRANKEL SOLDERLESS.
Westinghouse Elec. & Mfg Co.

CONSULTANTS (BUSINESS METHODS).
Ernst & Ernst.

CONSULTING ENGINEERS.
(See Architects and Engineers)

CONTRACTORS AND ENGINEERS—BUILDING.
Adams & Co., A. K.
Dowman, George.
Dowman-Dozier Mfg. Co.
Sirrine & Co., J. E.
Truscon Steel Co.

CONTRACTORS—ELECTRICAL.
(See Electrical Engineers.)

CONTRACTORS (PAINTING).
Williams, C. L.

CONTRACTORS (ROOFING).
Dowman, Geo.
Dowman Dozier Mfg. Co.
Murphy's Sons, C. P.

CONTRACTORS (PAVING).
McCrary Co., J. B.

CONTRACTORS (WATERWORKS).
McCrary Co., J. B.

CONTRACTORS (SEWAGE).
McCrary Co., J. B.

CONTROLLING INSTRUMENTS—TEMPERATURE.
Bristol Co.
Foxboro Co., Inc.
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Taylor Instrument Co.

CONVEYORS—BELT.
(See Belt Conveyors.)

CONVEYING MACHINERY.
American Supply Co.
Chisholm-Moore Mfg. Co.
Cresson-Morris Co.
Curtis Pneumatic Mchry. Co.
Dowman, George.
Euclid Crane & Hoist Co.
Fulton Supply Co.
Link-Belt Co.
Mathews Gravity Carrier Co.
Morse Chain Co.
Phila. Drying Machinery Co.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Schofield, Wm. Co.
Wagner Mfg. Co.

CONVEYORS—PORTABLE.
Euclid Crane & Hoist Co.
Link-Belt Co.
Mathews Gravity Carrier Co.

CONVEYORS (ROLLER).
Mathews Gravity Carrier Co.

COOLERS.
(See Humidifying Apparatus.)

COOLERS—WATER.
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COOLING AND CONDITIONING EQUIPMENT.
American Blower Co.
Buckeye Blower Co.
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COOLING TOWERS.
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COPPER STAMPS AND STENCILS.
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CORDAGE MACHINERY.
Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

CORPORATION FINANCE (TEXTILE).
American Trust Co.

CORRUGATED SHEET STEEL.
Ryerson & Co., Inc., Jos. T.

COST SYSTEMS.
Ernst & Ernst.

COTTAGES (READY BUILT).
Minter Homes Co.

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COTTON FANS.
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Florsheim, H. A.
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Jamieson, J. B.
Judson Mills.
Lane & Co., J. H.
Meritzer, H. S.
Pacific Mills.
Quissett Mill.
Tolar & Hart.
Weimar Bros.
Wellington, Sears & Co.
Whitman Co., Inc., Wm.
Woodward, Baldwin & Co.

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Beer & Co., H. & B.
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Piedmont Bonded Warehouse & Comp. Co.

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Bahan Textile Mch. Co.
Barber-Colman Co.
Brown Co., David.
Butterworth & Sons, H. W.
Crompton & Knowles Loom Works.
Davis Mfg. Co., Frank.
Dary Ring Traveler Co.
Davis & Furber Mch. Co.
Draper Corporation.
Dowman, George.
Dryer Corp. of America.
Eclipse Textile Devices, Inc.
Emerson Apparatus Co.
Firsching Co., J. A.
Fletcher Works.
Foster Machine Co.
Foxboro Co., Inc.
Fulton Supply Co.
Harris Co., Geo. W.
Hetherington & Sons, Ltd., John.
Hopedale Mfg. Co.
Howard Bros. Mfg. Co.
Hunt Machine Co., Rodney.
Hyatt Roller Bearing Co.
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Lestershire Spool Mfg. Co.
Lowell Crayon Co.
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Parker Co., Walter L.
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Proctor & Schwartz, Inc.
Reutlinger, J. J.
Root Co.
Roy & Son, B. S.
Sargent's Sons Corp., C. G.
Saco-Lowell Shops.
Schaum & Uhlinger.
Schofield Co., Wm.
Shambow Shuttle Co.
Stafford Co.
Steel Heddle Mfg. Co.
Suter, Alfred.
Terrell Machine Co.
Textile Finishing Machinery Co.
Textile Rubber Co.
Toledo Scale Co.
Tolhurst Mch. Wks.
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Washurn & Sons, L. R.
Williams Co., J. H.
Whitin Machine Works.
Whitinsville Spinning Ring Co.

COTTON TAPE LOOM.
Fletcher Works.
Foster Mch. Co.
Schaum & Uhlinger.

COTTON YARN MILLS.
(See Yarn Manufacturers.)

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Bristol Co.
Foxboro Co.
Root Co.

COUNTERS—RESTAURANT.
(See Restaurant Equipment.)

COUPLING—SHAFT.
Cresson-Morris Co.
Dodge Mfg. Co.

COVERING—ROLLER.
Bond Co., Chas.

CRANES.
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CRAYONS.
Eclipse Crayon Co.
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Auto Creel Corp.
Suter, Alfred.

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Carolina Metal Culvert Co.

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(See Cloth Cutters.)

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(See Thread Cutters.)

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(See Boxes—Packing.)

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DEXTRINES.
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(See Scales.)

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DIE STOCKS.
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DOBBY CHAINS.
Crompton & Knowles Loom Wks.
Whitin Machine Works.

DOBBY CARDS.
Jacobs & Co., E. H.

DOFFING BOXES—MILL.
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DOFFER FILLETS.
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DOFFING CARS.
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Dowman, George.
Dowman-Dozier Mfg. Co.
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Talbert Iron & Steel Co.
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Carolina Metal Culvert Co.

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Whitin Machine Works.

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(See Electric Machinery.)

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(See Fountains—Drinking.)

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Buffalo Forge Co.
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Proctor & Schwartz, Inc.

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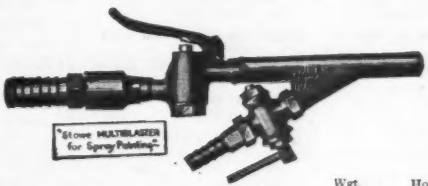

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Tolhurst Machine Works.

DUST COLLECTORS.
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Davis & Furber Mch. Co.
Proctor & Schwartz Inc.
Schofield & Sons, Wm.

DYERS, BLEACHERS AND FINISHERS.
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Boger & Crawford.
Dixie Mercerizing Co.
Franklin Process Co.
Sayles Finishing Plants, Inc.
United Piece Dye Wks.

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American Laundry Mchry. Co.
Butterworth & Sons Co., H. W.
Chemical Textile Engineers Inc.
Cole Mfg. Co., R. D.
Dryer Corp. of America.
Electro Bleaching Gas Co.
Firsching, J. A.
Fletcher Works.
Franklin Process Co.
Hightower Box & Tank Co.
Hungerford & Terry, Inc.
Hunt Machine Co., Rodney.
Klauder-Weldon Dyeing Mch. Co.
Phila. Drying Machinery Co
Proctor & Schwartz, Inc.
Reliance Machine Works.
Rome Machine & Fdry. Co.
Schaum & Uhlinger.
Textile Finishing Machinery Co., The.
Tolhurst Machine Works.
Woolford Wood Tank Co., G

DYEING MACHINES (PACKAGE AND SPOOL).
Franklin Process Co.

DYE BAGS OR NETS.
Smith Mfg. Co.

DYE STICKS.
Phila. Drying Machinery Co

DYE VATS AND TUBS.
(See Tanks or Bleaching Kiers.)

DYESTUFFS AND CHEMICALS.
Allen, Chas. R.
Arabol Mfg. Co.
Arnold, Hoffman & Co.
Borne, Scrymser Co.
Bosson & Lane.
Ciba Co., Inc.
Electro Bleaching Gas Co.
Fleischmann Co., The.
Ford Co., J. B.
Grasselli Chemical Co.
India Alkali Works.
Kali Mfg. Co
Klipstein & Co., A.
Lennig & Co, Chas.
Mathieson Alkali Works, Inc.
Metz & Co., H. A.
National Aniline & Chemical Co.
Newport Chemical Wks.
Quaker City Chemical Co.
Roessler & Hasslacher Chemical Co.
New Brunswick Chemical Co.
Penick & Ford, Ltd.
Rohm & Haas Co.
Sonneborn Sons, Inc., L.
Staley Mfg. Co., A. E.
Stein, Hall & Co.
Surpass Chemical Co.
United Chemical Products Corp.
Wolf & Co., Jacques.

ELECTRIC CONDITIONING OVENS.
Emerson Apparatus Co.

ELECTRIC CONDUIT AND FITTINGS.
(See Electrical Machinery and Supplies.)

ELECTRIC DYNAMOS AND MOTORS.
(See Motors and Generators.)

ELECTRIC FANS.
(See Fans—Electric.)

ELECTRIC LAMPS.
(See Lamps.)

ELECTRIC LAMP GUARDS.
Perry-Mann Electric Co.
Southern Elec. Supply Co.

ELECTRICAL ENGINEERS AND CONTRACTORS.
Curtis Co., The.
Huntington & Guerry, Inc.
McCrary Co., J. B.
Panton, Harrison D.
Perry-Mann Electric Co.

ELECTRIC LIGHTING ENGINEERS.
(See Illuminating Engineers.)

ELECTRICAL MACHINERY, INSTRUMENTS AND SUPPLIES.
Allis-Chalmers Mfg. Co.
American Blower Co.
Bristol Co.
Buffalo Forge Co.
Carter Electric Co.
Cooper Hewitt Electric Co.
Curtis Co., The.
Cutter Works, George.
Emerson Apparatus Co.
Euclid Crane & Hoist Co.
Fulton Supply Co.
General Electric Co.
Perry-Mann Electric Co.
Seawell, Luke.
Southern Elec. Supply Co.
Walsh & Weidner Boiler Co.
Westinghouse Elec. & Mfg. Co.

ELECTRIC POWER.
(See Power.)

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ELEVATORS.
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Mitchell Bissell Co.

ENAMEL—MILL WHITE.
(See Paint.)

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(See Architects.)

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Allis-Chalmers Mfg. Co.
Fulton Supply Co.

ENGINES (STEAM).
Allis-Chalmers Mfg. Co.
American Blower Co.
Cole Mfg. Co., R. D.
Fulton Supply Co.
Lombard Iron Works & Supply Co.
Toomey, Frank.

ENGINE ROOM APPLIANCES AND SUPPLIES.
American Blower Co.
Fulton Supply Co.
Jenkins Bros.
Locke Regulator Co.
Lunkenheimer Co.
Westinghouse Elec. & Mfg. Co.

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Locke Regulator Co.

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Ernst & Ernst.

ENGINEERS, CONTRACTORS & BUILDERS (SANITARY & PAVING).
McCrary Co., J. B.

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Panton, Harrison D.

ENGINEERS (MECHANICAL).
Bird-Potts & Co., Inc.

ENGRAVING AND CUTS.
Jacobs & Co.

ETCHING—(PRINTING).
Jacobs & Co.

EXHAUSTERS.
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EXPORTERS—COTTON.
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EXTRACTORS—HYDRO.
American Laundry Mchry. Co.
Fletcher Works.
Schaum & Uhlinger.
Tolhurst Machine Works.

FACTORY DESKS.
Lupton's Sons Co., David.

FACTORY AND INDUSTRIAL SITES.
(See Industrial Sites.)

FACTORY MANAGEMENT SYSTEMS.
Ernst & Ernst.

FANS—ELECTRIC.
American Blower Co.
Buckeye Blower Co.
Buffalo Forge Co.
Carter Electric Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

FANS—CONVEYING, POWER AND EXHAUST.
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FASTENERS—BELT.
(See Belt Fasteners.)

FEED WATER PURIFIERS.
(See Boiler Feed Water Purification.)

FEEDERS.
(See Automatic Feeders.)

FELTING MACHINERY.
Proctor & Schwartz, Inc.

FENCE—STEEL AND IRON.
Anchor Post Iron Works.
Cyclone Fence Co.
Dowman, George.

FENCE POSTS—CREOSOTED PINE.
Southern Wood Preserving Co.

FIBRE PRODUCTS.
Standard Fibre Co.

FILLETS (CYLINDER, DOFFER, BURNISHER AND STRIPPER).
Howard Bros. Mfg. Co.

FILLING BOARDS AND TRICKS (METAL).
Davis Mfg. Co., Frank.

FILLING—CAP AND WARP.
U S Bobbin & Shuttle Co.

FILM (MOTION PICTURE).
(See Theatre Equipment.)

FILTERS—WATER.
American Water Softener Co.
Hungerford & Terry, Inc.

FILTERS (ALUM).
Lennig & Co., Chas.

FILTER CLOTHS.
Smith Mfg. Co.

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(See Dyers, Bleachers and Finishers.)

FINISHING, BLEACHING AND SIZING MATERIALS.
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India Alkali Works.
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Klipstein & Co., A.
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Sonneborn Sons, Inc., L.
Staley Mfg. Co., A. E.
Stein, Hall & Co.
United Chemical Products Corp.
Warren Soap Mfg. Co.
Wolf & Co., Jacques.

FIRE ESCAPES.
Talbert Iron & Steel Co.

FIRE DOORS AND HARDWARE.
Bogert & Carlough.
Dowman-Dozier Mfg. Co.
Dowman, George.
Luptons Sons Co., David.
Sanymetal Products Co.
Truscon Steel Co.
Variety Fire Door Co.

FIRE HOSE.
(See Hose—Fire.)

FIRE PROTECTING PAINT.
(See Paint.)

FLAT STEEL HEDDLES.
Steel Heddle Mfg. Co.

FLAX SPINNING.
U S Bobbin & Shuttle Co.

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Allis-Chalmers Mfg. Co.
Cresson-Morris Co.

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Cooper Hewitt Electric Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

FLOORS (TAR CONCRETE).
Murphy's Sons, C. P.

FLOORING LUMBER.
Kirkpatrick Lumber & Timber Co.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.

FLOORING—WOOD BLOCKS.
Southern Wood Preserving Co

FLOOR SCRUBBING MACHINE
American Scrubbing Equipment Co.

FLOOR SCRUBBING POWDERS.
(See Scrubbing Powders.)

FLOOR SWEEPS.
(See Brushes.)

FLUTED ROLLS.
Howard & Bullough.
Proctor & Schwartz, Inc.
Saco-Lowell Shops.
Southern Spindle & Flyer Co
Whitin Machine Works.

FLUX (WELDING).
Oxweld Acetylene Co.

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Saco-Lowell Shops.
Southern Spindle & Flyer Co
Whitin Machine Works.

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Briggs-Schaffner Co.
Cole Mfg. Co., R. D.
Cresson-Morris Co.
Lombard Fdy. & Mch. Wks.

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Manufacturing Equip. & Eng' Co.
Murdock Mfg. & Supply Co.
Rundle-Spence Mfg. Co.

FRICTION CLUTCHES.
(See Clutches—Friction.)

FURNITURE (FOLDING—CAMP).
Smith Mfg. Co.

FURNITURE—MILL.
Durabilt Steel Locker Co.
Manufacturing Equip. & Eng' Co.
Mills Co.
Sanymetal Products Co.
Smith Mfg. Co.
Talbert Iron & Steel Co.

FUSES—ELECTRIC.
Carter Electric Co.
Fulton Supply Co.
Perry-Mann Electric Co.
Seawell, Luke.
Southern Electric Supply Co.

GARAGES (PORTABLE—METAL).
Dowman, George.

GARNETT MACHINES.
Proctor & Schwartz, Inc.

GAS ENGINES.
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GASOLINE LIGHTING SYSTEMS, LANTERNS, ETC.
Smith Mfg. Co.

GASOLINE CAMP STOVES.
Smith Mfg. Co.

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Bristol Co.
Fulton Supply Co.
Foxboro Co., Inc.
Taylor Instrument Co.

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Fulton Supply Co.
Lunkenheimer Co.

GAUGES (LIQUID LEVEL).
Foxboro Co., Inc., The.
Lunkenheimer Co.
Taylor Inst. Co.

GAUGES—WATER.
Fulton Supply Co.
Lunkenheimer Co.

GEARS—SILENT.
Dodge Mfg. Co.
Fulton Supply Co.
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Link-Belt Company.
Morse Chain Co.

GEAR CUTTING AND CUTTERS.
Cresson-Morris Co.

GEAR PULLERS.
General Electric Co.

GENERATORS—ELECTRIC.
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GLOVES (ASBESTOS).
Oxweld Acetylene Co.

GOGGLES (WELDING).
Oxweld Acetylene Co.

GLASSWARE AND DISHES
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GOVERNORS—PUMP.
General Electric Co.

GRAPHIC CHARTS.
Ernst & Ernst.

GRAPHITE.
Detroit Graphite Co.
Dixon Crucible Co., Jos.

GRATES—BOILER.
Cole Mfg. Co., R. D.
International Eng. Works.
Lombard Fdry. & Mch. Co.
Walsh & Weidner Boiler Co.

GRATES—MECHANICAL.
(See Stokers.)

GREASE.
(See Lubricants.)

GRAVEL AND SLAG ROOFING.
Murphy's Sons, C. P.

GREASE CUPS.
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GAUGES (WELDING).
Oxweld Acetylene Co.

GUARDS—ELECTRIC LAMP.
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GUARDS—MACHINE, SKY LIGHT, WINDOW, ETC.
Anchor Post Iron Works
Dowman, George.

GUIDES—THREAD.
Mitchell-Bissell Co.
Palmer Co., I. E.

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HACK AND BAND SAWS AND BLADES.
Racine Tool & Mch. Co.

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Jacobs & Co.

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Dowman, George.
Dowman-Dozier Mfg. Co.
Sanymetal Products Co.
Wagner Mfg. Co.

HARNESS—LOOM.
(See Loom Harness.)

HARNESS TWINE.
Harris Co., Geo. W.

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Lestershire Spool & Bobbin Co.
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Williams Co., J. H

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Crompton & Knowles Loom Works.
Steel Heddle Mfg. Co.
Williams Co., J. H.

HOISTS.
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Curtis Pneumatic Mchry. Co
Euclid Crane & Hoist Co.
Fulton Supply Co.
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Morse Chain Co.

HOPPER FEEDERS.
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HORNS AND MUSICAL INSTRUMENTS.
Conn, Ltd., C. G.

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Oxweld Acetylene Co

HOSIERY DYEING MACHINERY.
Cole Mfg. Co., R. D.
Franklin Process Co.
Philadelphia Drying Mchry. Co.

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HOTELS.
Hotel Almac.
Hotel Tuller.

HOUSES AND MILL COTTAGES (READY BUILT).
Minter Homes Co.

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American Blower Co.
Carrier Eng. Corp.
Parks-Cramer Co.

HUMIDIFYING INDICATING INSTRUMENTS.
Bristol Co
Foxboro Co., Inc., The.
Taylor Instrument Co

HUMIDITY RECORDERS.
Foxboro Co., Inc., The.

HYDGRODEIKS.
Taylor Instrument Co.

HYGROMETERS.
Foxboro Co.
Taylor Instrument Co.

HYDRANTS (FIRE).
Murdock Mfg. & Supply Co.

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ILLUMINATING ENGINEERS.
Cooper Hewitt Electric Co
Curtis Co., The.
Huntington & Guerry, Inc.
Panton, Harrison D.

INDICATING AND RECORDING INSTRUMENTS AND THERMOMETERS.
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Foxboro Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg Co.
Root Co.
Taylor Instrument Co.

INDIGO.
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INDUSTRIAL SITES.
Charlotte Chamber of Commerce.
Greenville Chamber of Commerce.
New Orleans Public Service, Inc.
Old Hickory Powder Plant
Spartanburg Chamber of oCmmerce.
Southern Ry.
Tennessee Electric Power Co.

INK—STENCIL AND MARKING.
Atlanta Stamp & Stencil Wks
Bradley Mfg. Co., A. J.

IRON AND STEEL.
Ryerson & Son, Inc., Jos. T
Talbert Iron & Steel Co.

IRON WORK—ORNAMENTAL.
Anchor Post Iron Works
Cyclone Fence Co.
Dowman, George.
Dufur & Co.
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JACQUARD HEDDLES.
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JOINT COMPOUND.
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Proctor & Schwartz, Inc.

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KETTLES—SODA.
Lombard Iron Works & Supply Co.

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Franklin Needle Co.
General Machine Works.
Granite State Needle Co.
Hemphill Mfg. Co.
Scott & Williams.
Torrington Co.
Trump Bros. Machine Co.
Wildman Mfg. Co.
Williams, Chauncey A.

KNITTING NEEDLES.
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Granite State Needle Co.
Torrington Co.
Williams, Chauncey A.

KNOTTERS.
Barber-Colman Co.
Mill Devices Co.

LABORATORY INSTRUMENTS.
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Scott & Co., Henry L.
Foxboro Co., Inc.
Root Co.
Taylor Instrument Co.

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Cooper Hewitt Electric Co.
Curtis Co., The.
Cutter Works, George.
General Electric Co.
Perry-Mann Electric Co.
Seawell, Luke.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

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LAMP REFLECTORS.
Carter Electric Co.
Cooper Hewitt Electric Co.
Curtis Co., The.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

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Saco-Lowell Shops
Whitin Machine Works.

LATHES.
Fulton Supply Co.

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Smith Mfg. Co.

LAUNDRY MACHINERY.
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Fletcher Works.
Hunt Machine Co., Rodney.
Rome Machine & Fdry. Co.
Schaum & Uhlinger.
Tolhurst Machine Works.

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Manufacturing Equip. & Eng'g Co.
Vogel Co., Jos. A.

LEAD BURNING APPARATUS (OXY-ACETYLENE AND OXY CITY GAS).
Oxweld Acetylene Co.

LEATHER BELTING.
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LEATHER SPECIALTIES.
American Supply Co.
Bond Co., Chas.
Graton & Knight Mfg. Co.

Jacobs Mfg. Co., E. H.
Williams & Sons, I. B.

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LINK BELTING.
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LINTERS.
(See Waste Dealers.)

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LOADERS—WAGON AND TRUCK.
Link-Belt Company.

LOCKERS AND CABINETS
Allen Co.
Dowman, George.
Durabilt Steel Locker Co.
Lupton's Sons Co., David.
Mills Co.
Manufacturing Equip. & Eng'g Co.
Sanymetal Products Co.

LOGWOOD EXTRACT.
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LOOMS.
Crompton & Knowles Loom Works.
Draper Corporation.
Fletcher Works.
Hopedale Mfg. Co.
Saco-Lowell Shops.
Schaum & Uhlinger.
Stafford Co.

LOOM ATTACHMENTS—AUTOMATIC
Draper Corporation.
Hopedale Mfg. Co.

LOOM HARNESS.
American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Crompton & Knowles Loom Wks.
Emmons Loom Harness Co.
Garland Mfg. Co.
Harris Co., Geo. W.
Steel Heddle Mfg. Co.

LOOPS (END).
Reutlinger Co., J. J.

LOOP PICKERS.
Jacobs Mfg. Co., E. H.

LUBRICANTS.
Dixon Crucible Co., Jos.
N. Y. & N. J. Lubricant Co.
Texas Co.

LUBRICATORS.
Lunkenheimer Co.
N. Y. & N. J. Lubricant Co.

LUG STRAPS.
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LUG STICKS.
Allen Co.

LUMBER.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.

LUNCH ROOM EQUIPMENT.
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MACHINE GUARDS.
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MACHINE TOOLS.
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MACHINISTS.
Bird-Potts Co., Inc.
Briggs-Schaffner Co.
Cole Mfg. Co., R. D.
Cresson-Morris Co.
Lombard Fdry. & Mch. Wks.

MAILS (INSERTED STEEL).
Reutlinger, J. J.

MANIFOLDS.
Oxweld Acetylene Co.

MARKING POTS, STENCILS, INKS, ETC.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

MENDING EYES.
Harris Co., Geo. W.

MERCERIZED YARNS.
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MERCERIZERS.
Aberfoyle Mfg. Co.
Amer. Yarn & Processing Co.
Boger & Crawford
Dixie Mercerizing Co.

MERCERIZED YARN.
Aberfoyle Mfg. Co.
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Boger & Crawford Co.

Dixie Mercerizing Co.
Hunter Mfg. & Comm. Co.

MERCERIZING MACHINERY.
Butterworth, H. W. & Sons Co.
Textile Finishing Machinery Co.

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Dowman, George.
Dowman-Dozier Mfg. Co.
Lupton's Sons Co., David.
Truscon Steel Co.

METAL CUTING MACHINES.
Racine Tool & Mch. Co.

METAL SIDING.
Dowman, George.
Dowman-Dozier Mfg. Co.

METALS—PERFORATED.
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METAL WORKS (SHEET).
Dowman-Dozier Mfg. Co.

METERS—FLOW, AIR, GAS, ELECTRIC, STEAM, ETC.
Allis-Chalmers Mfg. Co.
Carter Electric Co.
Foxboro Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

METERS—COUNTING.
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MILL BASKETS AND BOXES.
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MILL ENGINEER.
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MILL VILLAGES.
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MILL SUPPLIES—MISCELLANEOUS.
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MILL WHITE PAINT.
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MOPS.
Atlanta Brush Co.

MOTION PICTURES.
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MOTORS AND GENERATORS—ELECTRIC.
Allis-Chalmers Mfg. Co.
American Blower Co.
Carter Electric Co.
Curtis Co., The.
Fulton Supply Co.
General Electric Co.
Perry-Mann Electric Co.
Southern Electric Supply Co.
Westinghouse Elec. & Mfg. Co.

MOVING PICTURE MCH. AND SUPPLIES.
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MUSICAL INSTRUMENTS.
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Texas Co
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(See Engines Oil.)

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(See Finishing and Sizing Materials.)

OIL CUPS.
(See Lubricants.)

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OIL PUMPS.
(See Pumps—Oil.)

OIL SEPARATORS.
(See Separators.)

OILING DEVICES.
(See Lubricators.)

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(See Switchboards.)

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Dowman-Dozier Mfg. Co.
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Schofield Co., Wm.

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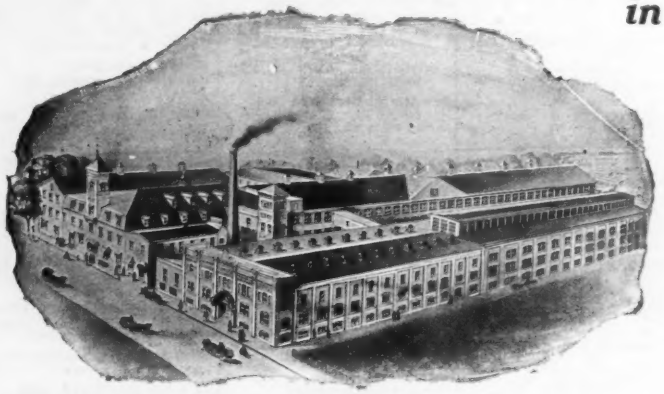

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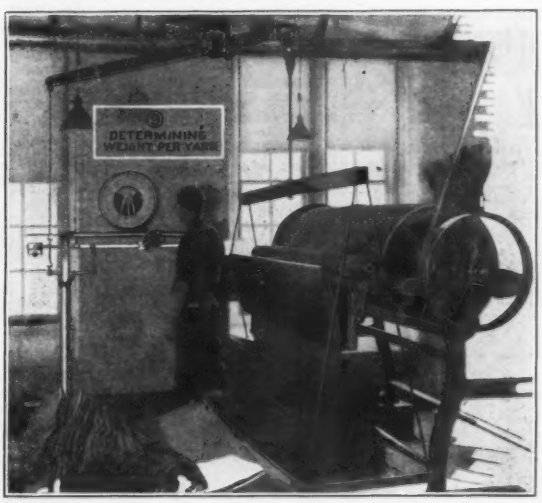

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(See Regulators—Pressure.)

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(See Lamp Reflectors.)

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(See Harness.)

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Talert Iron & Steel Co.

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Dowman-Dozier Mfg. Co.

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Dowman-Dozier Mfg. Co.
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(See Cloth.)

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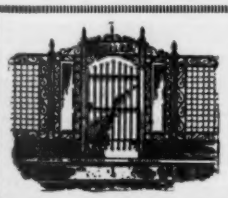

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Roessler & Hasslacher Chem. Co.

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Parker & Co., Walter L.
U S Bobbin & Shuttle Co.

SPEED VARYING TRANSMISSION.
Reeves Pulley Co.

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Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Whitin Machine Works.

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Howard & Bullough.
Saco-Lowell Shops.
Schaum & Uhlinger.
Whitin Machine Works.

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SPROCKETS.
Link-Belt Company.
Morse Chain Co.
Renold, Inc., Hans.

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Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.
Dixie Seal & Stamp Co.

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Corn Products Refining Co.
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Keever Starch Co.
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Sonneborn Sons, Inc., L.
Staley Co., A. E.
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Warren Soap Co.

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(See Engines—Steam.)

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(See Pumps—Steam.)

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(See Separators.)

STEAM TRAPS.
(See Traps—Steam.)

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Maryland Metal Bldg. Co.
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Rome Machine & Fdry. Co.
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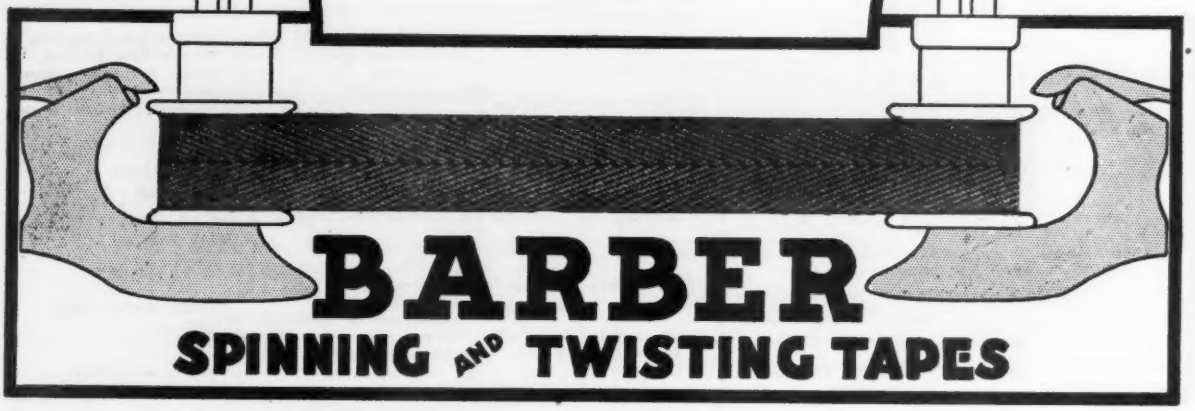

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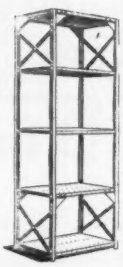

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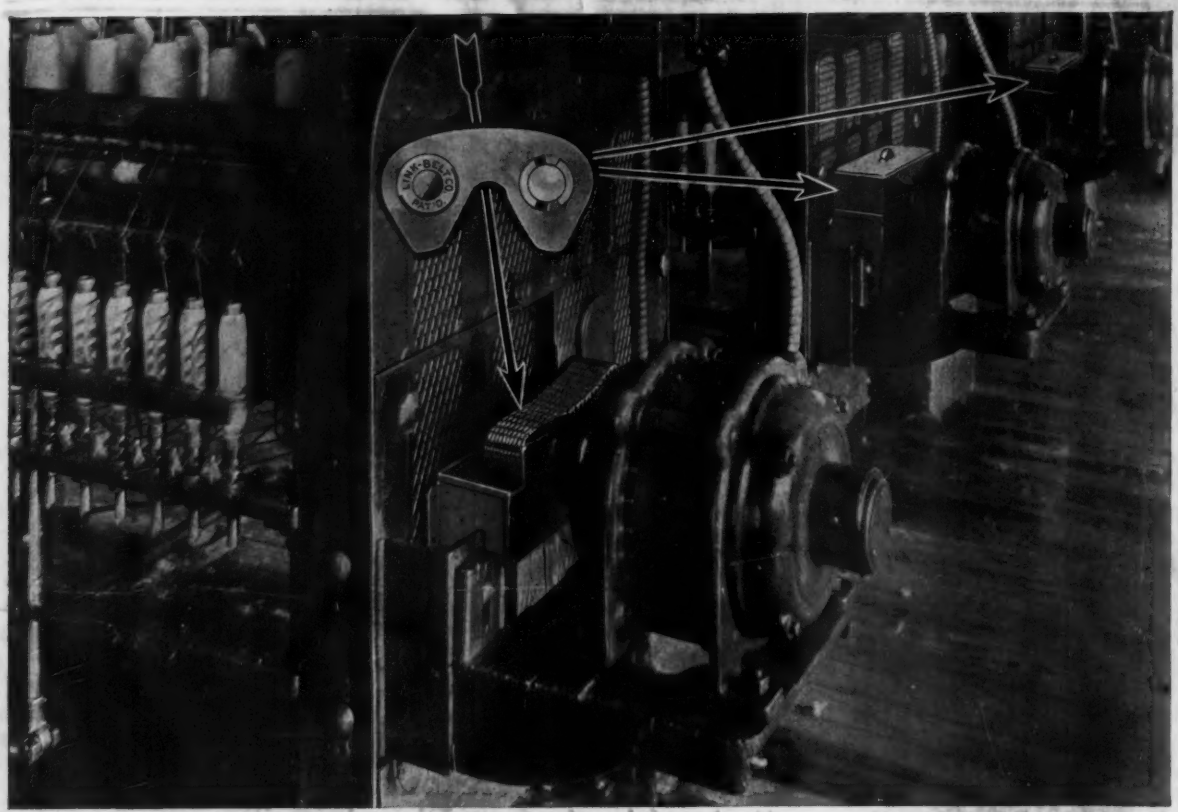

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